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# SOFTWOOD TREE VOLUME EQUATIONS FOR MAJOR CALIFORNIA SPECIES

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#### ABSTRACT

New cubic-foot, International 1/4-inch board-foot, and Scribner board-foot tree volume equations and tables are presented for eight species: Douglas-fir, Jeffrey pine, ponderosa pine, sugar pine, lodgepole pine, white fir, California red fir, and incense-cedar.

KEYWORDS: Cubic-foot volume tables (stand), board-foot stand volume tables.

#### INTRODUCTION

We have developed, for use in the Forest Survey of California, 1/2 new cubic-foot, International 1/4-inch board-foot, and Scribner board-foot tree volume equations for eight conifer species: Douglas-fir (Pseudotsuga menziesii (Mirb.) Franco), ponderosa pine (Pinus ponderosa Laws.), Jeffrey pine (Pinus jeffreyi Grev. & Balf.), sugar pine (Pinus lambertiana Dougl.), lodgepole pine (Pinus contorta Dougl.), white fir (Abies concolor (Gord. & Glend.) Lindl.), California red fir (Abies magnifica A. Murr.), and incensecedar (Libocedrus decurrens Torr.).

Previously, Forest Survey has relied on a series of local volume tables (California Forest and Range Experiment Station, Forest Survey 1956) to compile timber volume statistics for California. These tables assume average heights and form classes by site class based on Forest Survey data collected in the 1940's. The old tables no longer meet Forest Survey needs because (1) we are now interested in an accurate assessment of the volume on individual plots, for which we need volume estimates that take into account individual tree height variation; (2) height over d.b.h. and form class over d.b.h. ratios based on 25-year-old data may not accurately describe today's forest; and (3) the International 1/4-inch board-foot local volume tables assume a top utilization that does not conform with Forest Survey standards.

To replace the old tables, we needed volume equations that would provide comparable estimates of cubic, International 1/4-inch, and Scribner volume to Forest Survey utilization standards. The only existing tables suitable for statewide use (Clements and others 1949a, 1949b) were available only for the Scribner rule and varied by merchantable log height--a variable that is less desirable than total height for use on permanent plots. We therefore chose to develop our own equations.

### THE BASIC DATA

Our need was for volume equations suitable for use on trees throughout California. Ideally, for this purpose, we would have preferred a large sample of recently measured trees, drawn from the complete range of forest conditions found in the State. In practice, we were limited to available tree measurement data, since we had neither time nor funds to undertake our own measurements. The most readily available tree measurement data were assembled by Clements and others (1949a, 1949b) during the preparation of their form class volume tables for ponderosa pine, Douglas-fir, white fir, sugar pine, and red fir. The tables themselves are inadequate for our purposes because they are based on log height rather than total height and because they are developed only for the Scribner log rule. However, complete stem profiles are available for all the 2,110 trees used to develop the tables.

 $<sup>\</sup>frac{1}{2}$  A nationwide project of the U.S. Forest Service. The Pacific Northwest Forest and Range Experiment Station conducts the survey in Alaska, California, Hawaii, Oregon, and Washington.

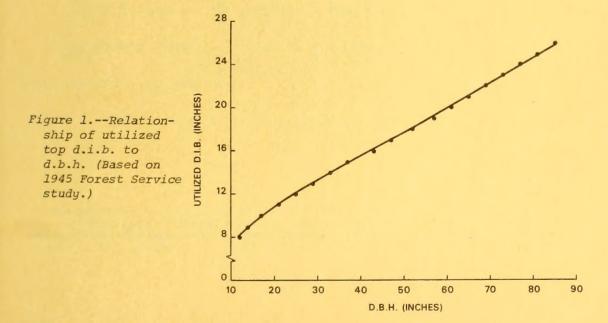
 $<sup>\</sup>frac{2}{}$  Unpublished cubic and International 1/4-inch rule volume tables on file at the Pacific Northwest Forest and Range Experiment Station.

The felled tree measurements used for the form class volume tables were, for the most part, taken 50-70 years ago. Both young- and old-growth trees were included from a range of sites scattered from the Modoc plateau south along the Sierra Nevada to the Sierra National Forest. To this sample, we added 957 dendrometer-measured trees from recent inventories of the Eldorado and Sierra National Forests. The latter trees included small samples of lodgepole pine and incense cedar--two species not included in the form class volume tables.

Although the size of our sample was more than adequate, the reader should be aware of some important data deficiencies. First, two-thirds of the sample was drawn from trees measured many years ago. While we recognized the danger of bias inherent in the use of old data, that risk seemed preferable to relying on a much smaller sample with a limited geographical distribution. Second, we were unable to find measured-tree data from the Coast Ranges or, more important, for trees under 11.0 inches in diameter breast high. In the case of California red fir, all our sample trees were over 14 inches. This lack of small-tree data posed a particular problem in developing cubic-foot equations, since volumes were needed for all trees 5.0 inches and larger. We were forced to extrapolate, using comparisons of existing tables as a guide to reasonableness. Finally, our sample data for lodgepole pine and incense-cedar were limited--26 trees of the former species and 46 of the latter--and confined to the southern Sierra Nevada. In spite of these scanty data, we decided to develop volume equations for both species, as an alternative preferable to using equations developed for some other species.

## DEVELOPING THE EQUATIONS

The STX program (Grosenbaugh 1967) was used to calculate three volumes for each of the sample trees: (1)  $CV_4$ --cubic-foot volume to a 4-inch minimum top d.i.b., (2)  $IV1/4_{6.5}$ --International 1/4-inch board-foot volume to a 6.5-inch minimum top d.i.b., and (3)  $SV_u$ --Scribner board-foot volume to a California utilized top as defined by a 1945 Forest Service study (California Forest and Range Experiment Station, Forest Survey 1956). The relationship of the utilized top d.i.b. to d.b.h. is shown in figure 1.



The method of analysis was essentially that used by Bruce and DeMars (1974). For each species and each log rule, tree volumes were fitted by weighted least squares by means of a stepwise multiple regression analysis. In order to obtain homogeneity of variance, each variable was divided by 0.005454154 (d.b.h.)<sup>2</sup> (total height)—the volume of a cylinder with a basal area and height equal to that of the sample tree. Our choice of independent variables was limited by the information available about the sample trees. Variables tested included d.b.h., total height, their powers, and cross products. Site class and age class (young growth or old growth) were also tried but dropped because their relative contribution to precision was small and their inclusion in the equations would have required the user to obtain site and age information.

The volume equations follow. Where applicable, restraints have been added to insure reasonable extrapolation. The following symbols have been used:

V = volume

D = diameter breast high

H = total height

F = form factor (the ratio of a tree's volume to that of a cylinder of the same diameter and height)

CF4 = cubic-foot form factor

IF1/46.5 = International 1/4-inch board-foot form factor to a 6.5-inch top d.i.b.

SF<sub>u</sub> = Scribner form factor (16-foot logs) to a California utilized top. 3/

To determine the volume of a given tree, first calculate the tree form factor, (transformed volume) using the appropriate equation for the species. Then multiply the form factor by the volume of a cylinder with the same height and basal area as the tree. Thus:  $V = 0.005454154\ D^2H\ F$ , where F is equal to the form factor appropriate for the species and log rule. The form factor equations are:

Species	Equation
Douglas-fir	$CF_4 \frac{4}{D} = 0.248569 + 0.0253524 \left(\frac{H}{D}\right) - 0.0000560175 \left(\frac{H^2}{D}\right)$
	IF1/4 <sub>6.5</sub> (when H $\geq$ 57 feet) = 1.575350 - 1269.84 ( $\frac{1}{DH}$ )
	+ 20.4816 $(\frac{1}{D})$ + 0.0000135387 H <sup>2</sup>

<sup>3/</sup> See figure 1.

 $<sup>\</sup>frac{4}{2}$  For all species except incense-cedar, CF<sub>4</sub> will be set equal to 0.4 whenever the equation value is higher than 0.4. When the equation value for CF<sub>4</sub> is lower than 0.3, it is set equal to 0.3. This will insure reasonable extrapolation beyond the limits of the study data.

 $IF1/4_{6.5}$  (when H < 57 feet) = 1.575350 - 1269.84 ( $\frac{1}{DH}$ ) Douglas-fir + 20.4816  $(\frac{1}{D})$  + 0.0000135387 H<sup>2</sup> + 7333.86  $(\frac{1}{p^2H})$  - 128.342  $(\frac{1}{p^2})$  $SF_{IJ} = 2.58530 - 83.5000 \left(\frac{1}{H}\right)$ Ponderosa and  $CF_4 = 0.402060 - 0.899914 \left(\frac{1}{D}\right)$ Jeffrey pine  $IF1/4_{6.5} = 3.02027 - 22.0313 \left(\frac{1}{D}\right) + 0.00201362 \text{ (H)}$  $SF_{11} = 3.22940 - 585.500 \left(\frac{1}{DH}\right) - 21.7575 \left(\frac{1}{D}\right)$  $CF_4 = 0.358550 - 0.488134 \left(\frac{1}{D}\right)$ Sugar pine IF1/4<sub>6.5</sub> = 2.75889 - 18.1229  $(\frac{1}{D})$  + 0.000225065  $(\frac{H^2}{D})$  $SF_{11} = 2.88706 - 25.2838 \left(\frac{1}{D}\right)$  $CF_4 = 0.422709 - 0.0000612236 \left(\frac{H^2}{D}\right)$ Lodgepole pine  $IF1/4_{6.5} = 2.86258 - 716.659 \left(\frac{1}{DH}\right)$  $SF_{ij} = 2.63048 - 850.630 \left(\frac{1}{DH}\right)$  $CF_4 = 0.299039 - 1.91272 \left(\frac{1}{H}\right) + 0.000367217 \left(\frac{H^2}{D}\right)$ White fir IF1/4<sub>6.5</sub> (when D  $\geq$  11.0 inches) = 2.08637 - 119.839 ( $\frac{1}{5}$ ) + 0.000620285  $(\frac{H^2}{D})$  $IF1/4_{6.5}$  (when D < 11.0 inches) = (0.45 + 0.05 D) (1.09597 + 0.000056389 H<sup>2</sup>)  $SF_{11} = 2.31733 - 16.9592 \left(\frac{1}{D}\right) + 0.000548156 \left(\frac{H^2}{D}\right)$ 

 $<sup>\</sup>frac{5}{}$  SF<sub>u</sub> will be set equal to 0.7 whenever it drops below this value to insure reasonable extrapolation from small trees. The volume of a tree with a minimum saw log diameter of 8 inches/inside bark by 12 feet long is 23 board feet.

California red fir 
$$CF_{4} = 0.231237 + 0.028176 \left(\frac{H}{D}\right)$$
 
$$IF1/4_{6..5} = 1.54320 + 0.00133466 \left(\frac{H^{2}}{D}\right)$$
 
$$SF_{u} = 1.59669 - 464.752 \left(\frac{1}{DH}\right) + 0.00105105 \left(\frac{H^{2}}{D}\right)$$
 
$$Incense-cedar \qquad CF_{4} = 0.225786 + 4.44236 \left(\frac{1}{H}\right)$$
 
$$IF1/4_{6..5} = 1.39269 + 0.0000259631 \text{ H}^{2}$$
 
$$SF_{u} = 1.82080 - 11.7184 \left(\frac{1}{D}\right)$$

Volumes calculated from these equations are in tables 1-21.

# RELIABILITY OF THE EQUATIONS

One measure of the reliability of an equation is the extent to which the individual observations deviate from the regression surfaces. A measure of this residual variation is the root mean squared error--the square root of the mean squared difference between the predicted and actual values. Table 22 shows the root mean squared error of each form factor equation, expressed both in absolute terms and as a percent of the average form factor.

It is generally desirable to test new equations against an independent source of data--data not used in the construction of the equations. We tested the equations on 441 trees from the Stanislaus National Forest which had been measured with an optical dendrometer. The results of this test, together with the results of a test of the old Forest Survey local volume tables, appear in table 23. Figures 2-9 illustrate the relationship between estimated and actual volume of the test trees. As expected, the new equations, based on d.b.h. and total height, account for more of the variation in individual tree volume than do the old tables based on d.b.h. alone. The old lodgepole pine and incensecedar tables gave very biased estimates of tree volume in this test. Tests against different trees in other geographic areas might well produce different biases. However, the new equations, which reflect differences in individual tree heights, should carry less risk of bias than the old tables, which rely on assumptions about the average relationships between heights and d.b.h. within a site class.

We also developed a complete set of volume equations which used Girard form class as one of the independent variables. When individual tree, Girard form class is known without error, these equations are more precise than the ones presented here. In practice, however, actual form class is seldom known. A common procedure is to use average form classes by species and sometimes by diameter class. We wondered whether the addition of form class would improve the estimate of individual tree volume when average form class was substituted for actual form class.

 $<sup>\</sup>frac{6}{}$  When the equation value for CF4 is < 0.27, it is set equal to 0.27 to insure reasonable extrapolation.

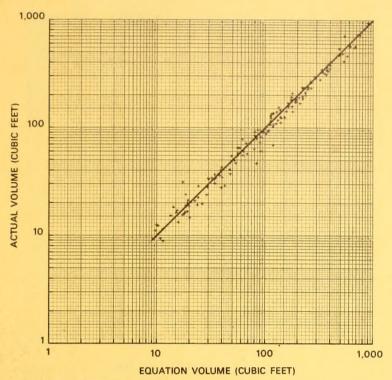


Figure 2.--Relationship between the measured cubicfoot volume of 146 ponderosa and Jeffrey pine trees and estimates from the new equation.

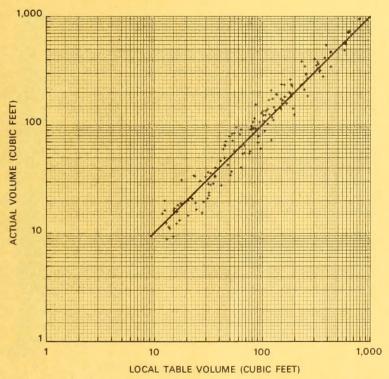


Figure 3.--Relationship between the measured cubicfoot volume of 146 ponderosa and Jeffrey pine trees and estimates from Forest Survey local volume tables.

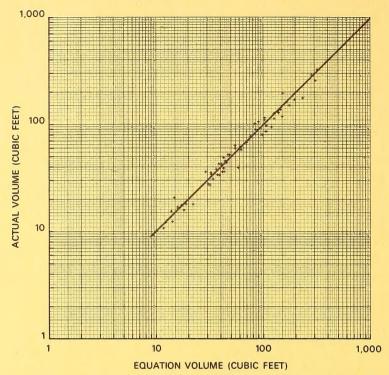


Figure 4.--Relationship between the measured cubicfoot volume of 60 lodgepole pine trees and estimated volume from the new equation.

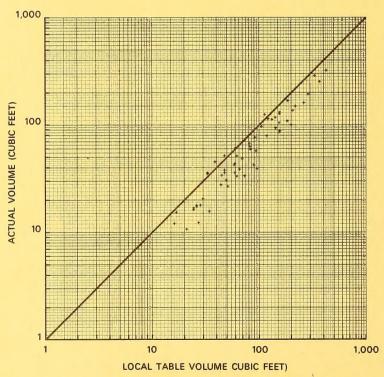


Figure 5.--Relationship between the measured cubicfoot volume of 60 lodgepole pine trees and estimates from the Forest Survey local volume tables.

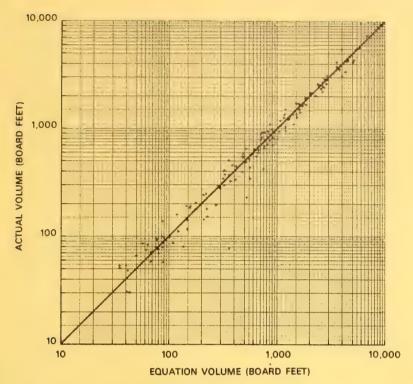


Figure 6.--Relationship between the measured International 1/4-inch board-foot volume of 146 ponderosa and Jeffrey pine trees and estimates from the new equation.

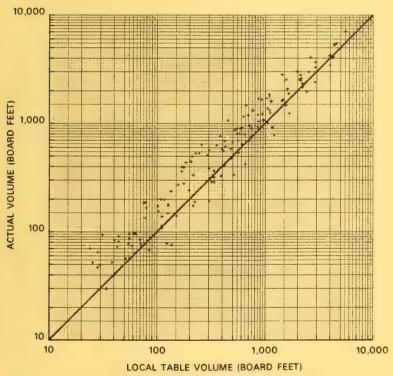


Figure 7.--Relationship between the measured International 1/4-inch board-foot volume of 146 ponderosa and Jeffrey pine trees and estimates from the Forest Survey local volume tables.

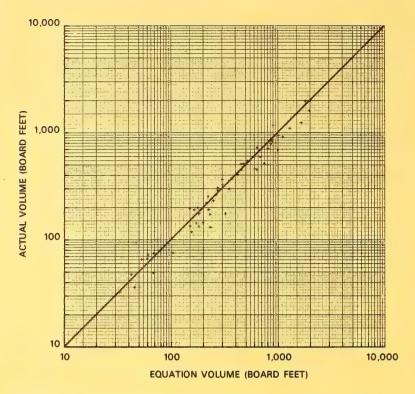


Figure 8.--Relationship between the measured International 1/4-inch board-foot volume of 60 lodgepole pine trees and estimates from the new equation.

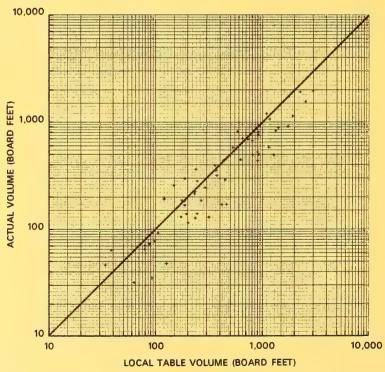


Figure 9.--Relationship between the measured International 1/4-inch board-foot volume of 60 lodgepole pine trees and estimates from the Forest Survey local volume tables.

To answer this question, we tested equations with and without form class against our 441 Stanislaus National Forest trees. The results of this test are in table 24. In this test, the extra precision gained by adding a form class variable was lost completely when average form class was substituted for actual form class, even though the actual average form classes of the test trees were used. We therefore decided not to include the form class equations in this note. We will be glad to supply the form class equations on request. However, we do not recommend their use unless form class is known for every tree.

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10							_				Total heightFeet	htFeet									
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346         381         415         450         488         526         564         602         640         678         716         753         789         822         891           377         415         452         490         528         568         610         651         692         733         773         813         852         891           409         450         491         532         573         614         657         701         745         789         875         918         891         989         1030           442         487         531         575         619         664         708         753         800         847         840         985         1030           477         525         573         620         668         776         821         881         942         1040         1,101         1,116         1,102         1,102         1,103         1,104           550         648         776         881         942         1,001         1,006         1,116         1,104         1,178         1,178         1,494         1,444           589         648         872         1,006 <td>222 253 2</td> <td>253</td> <td>253</td> <td></td> <td>2</td> <td>85</td> <td>317</td> <td>348</td> <td>380</td> <td>414</td> <td>450</td> <td>485</td> <td>521</td> <td>955</td> <td>591</td> <td>626</td> <td>661</td> <td>969</td> <td>729</td> <td>762</td> <td>795</td>	222 253 2	253	253		2	85	317	348	380	414	450	485	521	955	591	626	661	969	729	762	795
377         415         452         490         528         610         651         692         733         773         813         852         894         894         894         949         949         959         440         969         440         969         440         969         440         969         847         894         940         969         1,000         960         960         847         894         940         968         1,000         967         1,000         1,100         1,10	242 277 3	277	277		(C)	12	346	381	415	450	488	526	564	602	049	678	716	753	789	825	861
490         450         451         532         573         614         657         701         745         789         832         875         918         959           442         487         531         575         619         664         708         753         800         847         894         940         985         1,030           447         525         573         620         668         716         768         881         872         924         975         1,007         1,055         1,104           550         665         661         716         771         826         881         924         975         1,007         1,055         1,104           550         665         861         943         1,006         1,066         1,112         1,124         1,126         1,127         1,128         1,128         1,128         1,128         1,128         1,144           589         648         871         948         942         1,006         1,132         1,132         1,138         1,447         1,248         1,428         1,447           852         818         943         1,006         1,006         1,1	264 302	302	302		***	339	377	415	452	064	528	895	610	651	692	733	773	813	852	168	929
442         487         531         575         619         664         708         753         800         847         894         940         985         1,030           477         525         573         620         668         716         763         811         859         908         957         1,007         1,055         1,104           513         564         616         616         716         771         826         881         924         975         1,007         1,109         1,100<	286 327	327	327			368	604	450	491	532	573	614	657	701	745	789	832	875	918	959	1,000
477         525         573         620         668         716         763         811         859         908         957         1,007         1,055         1,104           513         564         616         667         718         770         821         881         924         975         1,026         1,078         1,129         1,180           550         665         661         716         771         826         884         942         1,001         1,046         1,101         1,156         1,237         1,236         1,180         1,237         1,236         1,180         1,180         1,180         1,196         1,196         1,101         1,156         1,121         1,156         1,136         1,237         1,236         1,236         1,236         1,236         1,236         1,236         1,236         1,236         1,136         1,144         1,146         1,146						398	442	487	531	575	619	499	708	753	800	847	894	046	985	1,030	1,074
513         564         616         667         718         770         821         872         924         975         1,026         1,078         1,180						429	477	525	573	620	899	716	763	811	859	908		1,007	1,055	1,104	1,151
550         665         661         716         826         881         936         1004         1,046         1,115         1,156         1,217         1,256           589         648         707         766         825         884         942         1,001         1,066         1,119         1,178         1,237         1,296         1,356           89         648         707         884         942         1,006         1,132         1,195         1,258         1,321         1,384         1,447           804         871         938         1,005         1,072         1,132         1,237         1,495         1,497         1,444         1,541           855         927         998         1,069         1,140         1,212         1,283         1,354         1,425         1,497         1,494         1,544           968         1,042         1,121         1,286         1,362         1,438         1,523         1,664         1,684         1,760           968         1,042         1,121         1,286         1,362         1,433         1,523         1,664         1,764         1,844           1,188         1,272         1,324						462	513	795	919	299	718	770	821	872	924	975		1,078	1,129	1,180	1,232
589         648         707         766         884         942         1,001         1,060         1,119         1,178         1,237         1,296         1,356         1,356         1,356         1,356         1,347         1,296         1,356         1,31         1,188         1,447         1,443						495	550	909	661	716	177	826	881	936	991	1,046	1,101	1,156	1,211	1,266	1,321
818 881 943 1,006 1,065 1,132 1,195 1,258 1,321 1,384 1,447  871 938 1,005 1,072 1,139 1,206 1,273 1,340 1,407 1,474 1,541  927 998 1,069 1,140 1,212 1,283 1,354 1,425 1,497 1,568 1,639  1,042 1,122 1,203 1,281 1,386 1,523 1,604 1,684 1,764 1,844  1,188 1,272 1,357 1,442 1,527 1,612 1,696 1,781 1,866 1,951  1,254 1,344 1,434 1,523 1,613 1,702 1,792 1,882 1,971 2,061  1,323 1,418 1,512 1,607 1,701 1,796 1,890 1,985 2,079 2,174  1,394 1,493 1,593 1,692 1,792 1,891 1,991 2,091 2,190 2,290  1,466 1,571 1,676 1,780 1,885 1,990 2,094 2,199 2,304 2,409						530	589	849	707	99/	825	884	945		090,1	1,119	1,178	1,237	1,296	1,355	1,414
871 938 1,005 1,072 1,139 1,206 1,273 1,340 1,407 1,474 1,541 1,541 927 998 1,069 1,140 1,212 1,28 1,354 1,425 1,497 1,568 1,639 984 1,059 1,135 1,211 1,286 1,362 1,438 1,513 1,589 1,665 1,740 1,740 1,042 1,122 1,203 1,283 1,363 1,443 1,523 1,604 1,684 1,764 1,844 1,846 1,272 1,357 1,442 1,527 1,612 1,696 1,781 1,866 1,951 1,254 1,344 1,434 1,523 1,613 1,702 1,792 1,882 1,971 2,061 1,323 1,418 1,512 1,607 1,701 1,796 1,890 1,985 2,079 2,174 1,394 1,493 1,593 1,692 1,790 2,094 2,199 2,304 2,409									755	818	881	943	1,006	1,069	1,132	1,195	1,258	1,321	1,384	1,447	1,510
927 998 1,069 1,140 1,212 1,283 1,354 1,425 1,497 1,568 1,639 984 1,059 1,135 1,211 1,286 1,362 1,438 1,513 1,589 1,665 1,740 1,042 1,122 1,203 1,283 1,363 1,443 1,523 1,604 1,684 1,764 1,844 1,188 1,272 1,357 1,442 1,527 1,612 1,696 1,781 1,866 1,951 1,254 1,344 1,434 1,523 1,613 1,702 1,792 1,882 1,971 2,061 1,323 1,418 1,512 1,607 1,701 1,796 1,890 1,985 2,079 2,174 1,394 1,493 1,593 1,692 1,792 1,891 1,991 2,091 2,190 2,290 1,466 1,571 1,676 1,780 1,885 1,990 2,094 2,199 2,304 2,409									804	871	938	1,005	1,072	1,139	1,206	1,273	1,340	1,407	1,474	1,541	1,608
984 1,059 1,135 1,211 1,286 1,362 1,438 1,513 1,589 1,665 1,740 1,042 1,122 1,203 1,283 1,363 1,443 1,523 1,604 1,684 1,764 1,844 1,844 1,188 1,272 1,357 1,442 1,527 1,612 1,696 1,781 1,866 1,951 1,254 1,344 1,434 1,523 1,613 1,702 1,792 1,882 1,971 2,061 1,323 1,418 1,512 1,607 1,701 1,796 1,890 1,985 2,079 2,174 1,394 1,493 1,593 1,692 1,792 1,891 1,991 2,091 2,190 2,290 1,466 1,571 1,676 1,786 1,890 2,094 2,199 2,304 2,409									855	927	866	1,069	1,140	1,212	1,283	1,354		1,497	1,568	1,639	1,711
1,042 1,122 1,203 1,283 1,363 1,443 1,523 1,604 1,684 1,764 1,844 1,844 1,188 1,272 1,357 1,442 1,527 1,612 1,696 1,781 1,866 1,951 1,254 1,344 1,434 1,523 1,613 1,702 1,792 1,882 1,971 2,061 1,323 1,418 1,512 1,607 1,701 1,796 1,890 1,985 2,079 2,174 1,394 1,493 1,593 1,692 1,792 1,891 1,991 2,091 2,190 2,290 1,466 1,571 1,676 1,780 1,885 1,990 2,094 2,199 2,304 2,409									908	984	1,059	1,135	1,211	1,286	1,362	1,438	1,513	1,589	1,665	1,740	1,816
1,272     1,357     1,442     1,527     1,612     1,696     1,781     1,866     1,951       1,344     1,434     1,523     1,613     1,702     1,792     1,882     1,971     2,061       1,418     1,512     1,607     1,701     1,796     1,890     1,985     2,079     2,174       1,493     1,593     1,692     1,792     1,891     1,991     2,091     2,190     2,290       1,571     1,676     1,780     1,885     1,990     2,094     2,199     2,304     2,409									962	1,042	1,122	1,203	1,283	1,363	1,443	1,523	1,604	1,684	1,764	1,844	1,924
1,344 1,434 1,523 1,613 1,702 1,792 1,882 1,971 2,061 1,418 1,512 1,607 1,701 1,796 1,890 1,985 2,079 2,174 1,493 1,593 1,692 1,792 1,891 1,991 2,091 2,190 2,290 1,571 1,676 1,780 1,885 1,990 2,094 2,199 2,304 2,409											1,188	1,272	1,357	1,442	1,527	1,612	1,696	1,781	1,866	1,951	2,036
1,418 1,512 1,607 1,701 1,796 1,890 1,985 2,079 2,174 1,493 1,593 1,692 1,792 1,891 1,991 2,091 2,190 2,290 1,571 1,676 1,780 1,885 1,990 2,094 2,199 2,304 2,409											1,254	1,344	1,434	1,523	1,613	1,702	1,792	1,882	1,971		2,150
1,493 1,593 1,692 1,792 1,891 1,991 2,091 2,190 2,290 1,571 1,676 1,780 1,885 1,990 2,094 2,199 2,304 2,409											1,323	1,418	1,512	1,607	1,701	1,796	1,890	1,985	2,079		2,268
1,571 1,676 1,780 1,885 1,990 2,094 2,199 2,304 2,409											1,394	1,493	1,593	1,692	1,792	1,891	1,991	2,091	2,190		2,389
											1,466	1,571	1,676	1,780	1,885	1,990		2,199	2,304	2,409	2,313

 $<sup>\</sup>frac{1}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE,--Block indicates extent of data.

Diameter breast height											Total hei	Total heightFeet									
inches!/	04	50	09	70	80	96	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
ç	33	75	5	22	03	411	136	158	181	204	228	253	776								
12	33	52	74	101	129	157	185	215	245	275	307	339	373								
14	949	72	101	135	170	206	242	280	318	357	397	439	482								
16	62	96	132	175	218	262	307	353	004	644	664	551	909								
60	<u>8</u>	123	168	219	271	324	379	435	492	551	612	675	740								
20	102	154	208	569	330	393	458	525	593	†99 <u>[</u>	736	812	890	176	1,055	1,142					
22	127	188	252	323	395	694	545	623	703	786	872	1961	1,053	1,148	1,247	1,350					
24	154	226	301	382	994	551	639	730	823	919	1,019	1,122	1,229	1,340	1,455	1,575					
56	184	267	353	244	543	049	741	845	952	1,062	1,177	1,295	1,418	1,546	1,679	1,818					
28		312	410	516	625	736	850	896	1,090	1,216	1,346	1,481	1,621	1,767	1,919	2,077					
30		360	472	591	713	838	196	1,100	1,237	1,379	1,526	1,679	1,838	2,003	2,175	2,354	2,541	2,735	2,938	3,150	3,371
32		411	537	670	807	947	1,091	1,240	1,394	1,553	1,718	1,890	2,068	2,253	2,447	2,648	2,858	3,077	3,306	3,544	3,793
34			209	755	907	1,063	1,223	1,389	1,560	1,737	1,921	2,112	2,311	2,518	2,734	2,959	3,194	3,439	3,694	3,961	4,240
36			681	844	1,012	1,185	1,362	1,545	1,735	1,931	2,135	2,347	2,568	2,798	3,037	3,287	3,548	3,820	4,104	4,401	4,711
38				939	1,124	1,313	1,509	1,710	1,919	2,136	2,361	2,595	2,838	3,092	3,356	3,632	3,920	4,221	4,536	4,864	5,207
40				1,039	1,241	1,449	1,663	1,884	2,113	2,351	2,597	2,854	3,121	3,400	3,691	3,994	4,311	4,642	4,989	5,350	5,728
42				1,143	1,364	1,590	1,824	2,066	2,316	2,576	2,845	3,126	3,418	3,723	4,041	4,374	4,721	5,084	5,463	5,855	6,273
ħ.p.				1,253	1,492	1,739	1,993	2,256	2,528	2,811	3,105	3,410	3,729	4,061	4,408	4,770	5,149	5,545	5,958	6,391	6,843
94					1,627	1,894	2,170	2,455	2,750	3,056	3,375	3,707	4,053	4,413	4,790	5,184	5,595	6,026	9/4'9	946,9	7,438
84				1,487	1,767	2,056	2,354	2,661	2,981	3,312	3,657	4,016	4,390	4,780	5,188	5,615	090'9	6,526	7,014	7,524	8,058
20				1,612	1,914	2,224	2,545	2,877	3,221	3,578	3,950	4,337	4,740	5,162	5,602	6,062	445,9	7,047	7,574	8,125	8,702
52.						2,399	2,744	3,100	3,470	3,854	4,254	4,670	5,104	5,558	6,032	6,527	7,046	7,588	8, 155	8,749	9,370
54						2,581	2,950	3,332	3,729	4,140	4,569	5,016	5,482	5,969	6,477	600,7	7,566	8,148	8,758	9,396	10,064
95						2,769	3,164	3,572	3,996	4,437	4,896	5,374	5,873	6,394	6,939	7,509	8,105	8,729	9,382	10,066	10,782
585						2,964	3,385	3,821	4,274	4,744	5,234	5,744	6,277	6,834	7,416	8,025	8,662	ſ	10,028	10,759	11,524
09						3,165	3,614	4,078	4,560	5,061	5,583	6,127	969,9	7,288	7,909	8,558	9,238			11,475	12,292
62									4,856	5,388	5,943	6,522	7,126	7,757	8,418	9,109	9,832			12,214	13,084
49									5,161	5,726	6,315	6,929	7,571	8,241	8,942	9,676	10,445		12,093	12,976	13,900
99									5,475	6,074	869,9	7,349	8,028	8,739	9,483	10,261	11,076		12,824	13,761	14,742
89									5,798	6,432	7,092	7,780	8,500	9,252	10,039	10,863	11,726		13,577	14,569	15,608
70									6,131	6,800	7,497	8,225	8,985	9,779	10,611	11,482	12,394		14,351	15,399	16,498
72											7,914	8,681	9,483	10,321		12,118	13,081		15,146	16,253	17,414
74											8,341	9,150	9,995	10,878	11,803	12,771	13,786		15,963	17,130	18,354
76											8,781	9,631	10,520	11,449	12,422	13,442	14,509		16,801	18,030	19,318
78											9,231	10,124	11,058	12,035	13,058	14,129	15,251	16,428	17,661	18,953	20,308
80											9,692	10,630	11,610	12,635	13,709	14,834	16,012	17,247 1	18,542	19,899	21,321

 $\frac{1}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOIE.--Block indicates extent of data.

1	2/23         36         56         77         97         117         137         158         178         198           23         49         77         104         132         159         167         215         220           28         64         172         208         244         280         317         349           35         81         177         172         208         244         280         317         446           43         100         156         213         269         326         438         495         551         401         446           43         100         156         213         326         394         462         530         359         667           53         144         225         386         446         399         355         401         446         467           43         166         350         478         462         530         599         667         551         631         771         784         171         771         771         771         772         771         471         772         778         474         878         771	Diameter breast height										Total heightFeet	3htFeet									
27.3         S6         77         91         116         119         126         129         229         445         446         259         445         445         445         446         720         130	2/23         36         56         77         97         117         137         158         178         198         198         215         242         270         23         23         244         286         317         353         353         365         344         286         317         353         353         365         344         286         317         353         353         365         461         369         355         401         446         369         365         462         530         353         466         569         359         465         550         641         369         467         569         641         771         446         569         590         661         771         446         569         590         641         771         446         560         642         530         657         551         646         570         647         741         886         931         11,124         11,124         11,124         11,124         11,240         11,124         11,240         11,240         11,240         11,240         11,240         11,240         11,240         11,240         11,240         11,240         11,240         11,		50	09	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
This is a continue of the co	2/2         36         56         77         97         117         137         159         167         169         172         249         224         280         242         270           28         64         100         156         172         208         244         380         491         446         446         448         448         449         446         448         448         446         550         469         550         667         448         469         550         667         448         469         560         667         771         446         568         667         771         784         446         570         661         771         784         446         571         446         571         446         561         771         784         446         571         478         667         771         784         469         587         663         871         1460         689         871         1472         1472         1489         1441         1441         1441         1440         1440         1440         1440         1440         1440         1440         1440         1440         1440         1440         <																					
1	23         49         77         104         132         159         187         215         240         250         317         353           28         64         100         136         172         208         244         280         317         353           35         121         189         265         394         462         590         590         667           63         144         225         387         469         550         631         712         794           63         144         225         387         469         550         631         712         794           63         144         225         386         455         550         644         865         931         1401         446         570         1408         1401         446         550         644         869         837         1428         869         970         1,080         1401         446         570         1,480         1,411         1420         1,580         1,411         1,440         1,411         1,420         1,411         1,420         1,411         1,420         1,411         1,420         1,420         1,411	2/23	36	56	77	97	117	137	158	178	198	219	239	259								
1	28         64         100         136         172         208         244         280         317         353           35         81         172         218         264         309         355         401         446           43         100         156         213         265         394         462         599         667           53         144         226         387         465         560         631         712         794           73         169         264         359         455         550         6445         711         836         931           196         306         417         527         638         748         859         970         1,080           225         340         455         550         6445         711         836         931         1,400         1,080           256         400         544         689         833         978         1,122         1,400         1,400         1,400         1,400         1,400         1,400         1,400         1,400         1,400         1,400         1,400         1,400         1,400         1,400         1,400         1,400 <th>23</th> <th>64</th> <th>77</th> <th>104</th> <th>132</th> <th>159</th> <th>187</th> <th>215</th> <th>242</th> <th>270</th> <th>298</th> <th>325</th> <th>353</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	23	64	77	104	132	159	187	215	242	270	298	325	353								
100   155   121	35         81         127         172         218         264         309         355         449         446         551         551         551         446         445         551         651         551         551         551         551         651         446         553         651         452         553         654         559         667         752         658         741         712         794         667         753         658         748         859         950         1,113         1,240         257         668         971         1,113         1,240         <	28	19	100	136	172	208	244	280	317	353	389	425	194								
1, 19, 27, 36, 34, 36, 36, 36, 37, 38, 38, 38, 38, 38, 38, 38, 38, 38, 38	43         100         156         213         269         325         438         495         567         667           53         121         189         257         326         394         462         530         599         667           63         144         225         336         387         462         550         643         712         794           63         147         626         354         748         859         966         1,113         1,240           225         352         478         669         833         748         859         966         1,411           256         400         544         669         833         978         1,122         1,266         1,411           452         615         778         941         1,104         1,267         1,430         1,595           466         689         872         1,054         1,237         1,420         1,603         1,786           468         971         1,175         1,337         1,420         1,603         1,786           868         971         1,433         1,582         1,816         1,816         1,	35	81	127	172	218	797	309	355	401	944	492	538	583								
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	53         121         189         257         326         394         462         530         599         667           63         144         225         366         387         469         550         631         712         794           73         169         264         359         465         550         645         741         896         931           256         400         544         669         833         978         1,112         1,240         1,240           256         400         544         669         832         978         1,112         1,240         1,240           256         400         689         872         1,054         1,237         1,420         1,593         1,786         1,999           768         971         1,175         1,379         1,420         1,603         1,786         1,999           851         1,002         1,005         1,005         1,237         1,420         1,603         1,786           10,22         1,024         1,237         1,420         1,603         1,786         1,786         1,796           1,029         1,1175         1,437         <	43	100	156	213	269	325	382	438	495	551	209	499	720	777	833	889					
63 144 225 326 387 469 689 681 1712 1.266 1.411 1.202 1.2127 1.131 1.132 1.232 1.243 2.255 2.259 2.262 2.245 1.243	63 144 225 366 387 469 550 645 741 836 931 196 306 417 527 638 748 859 970 1,080 225 352 478 605 732 859 966 1,113 1,240 256 689 872 1,054 1,227 1,227 1,226 1,393 4,06 689 871 1,076 1,302 1,527 1,727 1,379 1,582 1,989 851 1,026 1,393 1,029 1,302 1,527 1,237 1,237 1,237 1,979 2,204 1,225 1,225 1,226 1,399 1,025 1,302 1,327 1,227 1,727 1,379 1,989 2,191 1,225 1,227 1,379 1,582 1,989 1,122 1,227 1,727 1,379 1,582 1,999 2,204 1,325 1,327 1,227 1,329 1,682 2,034 2,189 2,121 2,394 2,667 1,325 1,225 1,226 2,394 3,195 2,249 3,174 1,329 1,682 2,034 2,387 2,739 3,944 3,725 2,202 2,394 3,495 3,998 4,320 2,737 3,211 3,686 4,160 4,634 2,296 2,737 3,211 3,686 4,160 4,524 9,960 2,737 3,211 3,686 4,160 4,524 9,960 2,737 3,211 3,686 4,160 4,524 9,960 2,737 3,211 3,686 4,160 4,754 5,296 5,643 5,788 6,370 6,001 5,789 5,788 6,370 6,001 5,789 5,789 5,789 6,001 5,789 5,789 5,789 6,001 5,789 5,789 5,789 6,001 5,789 5,789 5,789 6,751 5,789 5,789 6,751 5,789 5,789 6,751 5,789 5,789 6,751 5,789 5,789 5,789 6,751 5,789 5,789 6,751 5,789 5,789 6,751 5,789 5,789 6,751 5,789 5,789 6,751 5,789 5,789 5,789 5,789 6,751 5,789 5,789 5,789 6,751 5,789 5,789 6,751 5,789 5,789 5,789 5,789 6,789 5,789	53	121	189	257	326	394	462	530	599	299	735	803	872	046	1,008	1,076					
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	73         169         264         359         455         646         741         836         930         1,080           225         352         478         605         732         859         986         1,113         1,240           256         400         544         689         833         978         1,122         1,566         1,411           452         615         778         941         1,104         1,267         1,430         1,583           406         689         872         1,054         1,267         1,430         1,583           406         689         872         1,054         1,267         1,480         1,583           851         1,076         1,322         1,582         1,480         1,933         1,786           883         1,187         1,435         1,584         1,933         1,986         1,989           851         1,029         1,302         1,575         1,848         2,121         2,944           1,029         1,322         1,435         1,484         1,933         2,184         3,174           1,125         1,423         1,722         2,020         2,344	63	144	225	306	387	694	550	631	712	794	875	956	1,037	1,118	1,200	1,281					
196 366 417 527 688 79 1,108 1,191 1,152 1,178 1,140 1,181 1,178 1,140 1,181 1,178 1,178 1,178 1,178 1,178 1,178 1,178 1,178 1,181 1,178 1,140 1,181 1	196   306   417   527   638   748   859   970   1,080     225   352   478   665   732   859   986   1,113   1,240     256   400   544   689   833   978   1,122   1,265   1,411     452   615   778   941   1,104   1,267   1,430   1,593     406   689   872   1,054   1,237   1,420   1,603   1,785     581   1,076   1,322   1,684   1,933   1,784   2,181   2,430     1,029   1,320   1,435   1,684   1,933   2,181   2,430     1,125   1,423   1,722   2,020   2,318   2,617   2,915     1,225   1,520   1,875   2,199   2,524   2,849   3,174     1,329   1,682   2,034   2,387   2,739   3,092   3,444     1,329   1,682   2,034   2,387   2,739   3,092   3,444     2,525   2,994   3,436   3,878   4,320     2,526   2,337   2,738   3,934   3,725     2,526   2,394   4,452   4,660     2,526   2,397   3,437   3,944   4,452   4,660     2,526   2,329   3,437   3,944   4,452   4,660     2,526   2,529   3,437   3,944   4,452   6,001     2,526   2,529   3,437   3,944   4,452   6,001     2,526   2,526   2,526   2,526   2,643     2,667   2,643   2,643     2,667   2,643   2,643     2,667   2,643   2,643     2,667   2,643     2,667   2,643     2,667   2,643     2,677   2,675     2,526   2,994   3,436   3,878     4,526   4,560     2,526   2,994   3,436   3,436     2,667   2,667     2,526   2,994   3,436   3,878     2,667   2,667     2,667   2,667     2,667   2,667     2,667   2,667     2,667   2,667     2,667   2,667     2,667   2,667     2,667   2,667     2,667   2,667     2,	73	169	264	359	455	550	645	741	836	931	1,027	1,122	1,217	1,313	1,408	1,503					
255 532 446 669 833   1,100	255 352 478 665 732 859 986 1,113 1,240 256 400 544 689 833 978 1,122 1,266 1,411 452 615 778 941 1,104 1,267 1,430 1,593 406 689 872 1,054 1,237 1,420 1,603 1,786 851 1,076 1,302 1,527 1,753 1,979 2,204 938 1,187 1,432 1,527 1,753 1,979 2,204 1,029 1,302 1,575 1,848 2,121 2,394 2,667 1,125 1,550 1,875 2,199 2,524 2,849 3,174 1,329 1,682 2,034 2,387 2,739 3,042 3,444 1,329 1,682 2,034 2,387 2,963 3,344 3,725 2,572 2,994 3,436 3,878 4,320 2,737 3,211 3,686 4,160 4,634 2,959 3,437 3,944 4,452 4,960 2,950 3,437 3,944 4,452 6,001 5,787 3,788 5,789 5,		196	306	417	527	638	748	859	970	1,080	1,191	1,301	1,412	1,522	1,633	1,743					
256 400 544 689 83 1,122 1,266 1,266 1,411 1,525 1,736 1,910 1,844 1,988 2,133 2,277 2,421 2,586 2,710 2,585 4,00	256         400         544         689         833         978         1,126         1,410         1,267         1,410         1,593         1,411         1,593         1,411         1,593         1,411         1,593         1,785         1,411         1,593         1,785         1,411         1,593         1,785         1,411         1,785         1,785         1,786         1,989         1,785         1,786         1,989         1,785         1,786         1,989         2,204         1,785         1,786         1,989         2,204         1,785         1,786         1,989         2,204         1,785         1,786         1,989         2,204         1,789         1,786         1,989         2,204         1,789         1,786         1,989         2,204         2,984         1,786         1,989         2,204         2,430         1,789         2,430         3,174         1,174         1,174         1,174         1,174         1,174         1,174         1,174         1,175         1,175         1,175         1,175         1,175         1,175         1,175         1,175         1,175         1,175         1,175         1,175         1,175         1,175         1,175         1,175         1,175         1,175		225	352	478	605	732	859	986	1,113	1,240	1,367	1,494	1,621	1,748	1,874	2,001	2,128	2,255	2,382	2,509	2,636
452 615 778 941 1.104 1.267 1.429 1.529 1.526 1.919 2.082 2.245 2.408 2.551 2.734 2.839 3.060 3.223 4.025 4.025 6.689 872 1.054 1.327 1.422 1.625 1.929 2.193 2.379 2.600 2.804 3.007 3.211 3.415 3.618 3.822 4.025 8.21 1.024 1.327 1.423 1.422 1.223 1.229 1.222 1.229 1.222 2.020 2.318 2.617 2.329 2.629	452         615         778         941         1,104         1,267         1,430         1,593           406         689         872         1,054         1,237         1,420         1,603         1,785           768         971         1,175         1,379         1,582         1,786         1,989           851         1,076         1,302         1,527         1,573         1,979         2,204           938         1,187         1,435         1,684         1,933         2,181         2,430           1,029         1,302         1,575         1,848         2,121         2,394         2,667           1,125         1,423         1,722         2,020         2,318         2,617         2,915           1,225         1,550         1,875         2,139         2,567         2,849         3,174           1,329         1,682         2,034         2,387         2,717         3,444         2,175           1,329         1,682         2,034         2,387         3,444         3,725           2,520         2,534         3,436         3,464         4,522         4,950           2,524         2,963         3,437		256	400	544	689	833	978	1,122	1,266	1,411	1,555	1,700	1,844	1,988	2,133	2,277	2,421	2,566	2,710	2,855	2,999
4.06 689 882 1,094 1,237 1,420 1,603 1,786 1,986 2,151 2,334 2,516 2,629 2,081 3,017 3,118 3,018 3,124 4,025 4,025 851 1,076 1,322 1,522 1,733 1,379 2,204 2,430 2,520 2,881 3,176 3,176 4,025 3,578 3,178 4,020 4,235 4,405 1,221 1,027 1,122 1,022 1,222 1,522 1,522 1,283 2,178 3,178 3,178 3,178 4,020 4,235 4,171 4,422 4,460 1,122 1,122 1,122 1,234 2,181 2,141 2,143 3,123 3	406         689         872         1,024         1,237         1,420         1,603         1,785           768         971         1,175         1,379         1,582         1,786         1,989           851         1,076         1,302         1,527         1,753         1,979         2,204           938         1,187         1,435         1,684         1,933         2,181         2,430           1,029         1,302         1,575         1,848         2,121         2,394         2,667           1,125         1,423         1,722         2,020         2,318         2,617         2,915           1,225         1,550         1,875         2,199         2,524         2,849         3,174           1,329         1,682         2,034         2,387         2,739         3,944         3,725           2,200         2,581         2,963         3,444         3,725         2,963         3,444           2,522         2,994         3,436         3,878         4,320           2,524         2,963         3,437         3,944         4,452         4,960           2,737         3,437         3,944         4,452         4,960			452	615	778	941	1,104	1,267	1,430	1,593	1,756	1,919	2,082	2,245	2,408	2,571	2,734	2,897	3,060	3,223	3,386
	768       971       1,175       1,582       1,786       1,989         851       1,076       1,302       1,527       1,753       1,979       2,204         938       1,187       1,435       1,684       1,933       2,181       2,430         1,029       1,302       1,575       1,848       2,121       2,394       2,430         1,125       1,423       1,722       2,020       2,318       2,617       2,915         1,225       1,550       1,875       2,199       2,524       2,849       3,174         1,329       1,682       2,034       2,387       2,739       3,944       3,725         2,200       2,581       2,963       3,444       3,725       2,295       3,437       3,878       4,017         2,552       2,994       3,436       3,878       4,530       2,565       5,643         2,929       3,437       3,944       4,452       4,960         2,929       3,437       3,944       4,452       4,960         2,929       3,437       3,944       4,452       4,960         2,643       5,643       5,643       5,643       5,786       5,643			904	689	872	1,054	_		1,603	1,785	1,968	2,151	2,334	2,516	2,699	2,882	3,065	3,247	3,430	3,613	3,796
Signorman   Sign	851       1,076       1,332       1,527       1,753       1,979       2,204         938       1,187       1,435       1,684       1,933       2,181       2,430         1,029       1,302       1,575       1,848       2,121       2,394       2,430         1,125       1,423       1,722       2,020       2,318       2,617       2,915         1,225       1,550       1,875       2,199       2,524       2,849       3,174         1,329       1,682       2,034       2,387       2,739       3,992       3,444         1,329       1,682       2,034       2,387       2,739       3,444       3,725         2,200       2,581       2,963       3,444       3,725       2,963       3,444         2,573       2,784       3,195       3,606       4,017       4,320         2,552       2,994       3,436       3,878       4,360       4,530         2,929       3,437       3,944       4,452       4,960         2,929       3,437       3,944       4,452       4,960         2,643       5,643       5,78       5,643         2,606       6,060       6,060 <th></th> <th></th> <th></th> <th>768</th> <th>176</th> <th>1,175</th> <th>1,379</th> <th></th> <th>1,786</th> <th>1,989</th> <th>2,193</th> <th>2,397</th> <th>2,600</th> <th>2,804</th> <th>3,007</th> <th>3,211</th> <th>3,415</th> <th>3,618</th> <th>3,822</th> <th>4,025,</th> <th>4,229</th>				768	176	1,175	1,379		1,786	1,989	2,193	2,397	2,600	2,804	3,007	3,211	3,415	3,618	3,822	4,025,	4,229
938 1,187 1,435 1,684 1,1931 2,181 2,430 2,579 2,928 3,176 3,425 3,674 3,922 4,171 4,420 4,669 4,918 1,1029 1,322 1,322 2,202 2,318 2,617 2,193 3,213 3,121 3,846 3,723 4,419 4,419 4,419 4,410 4,103 4,402 4,105 5,103 5,104 5,139 1,322 1,322 1,322 1,322 1,322 2,320 2,334 3,723 3,410 3,723 4,186 4,864 5,220 5,520 5,520 5,531 6,132 6,132 6,132 6,132 6,132 6,132 6,132 6,132 6,132 6,132 6,132 6,133	938 1,187 1,435 1,684 1,933 2,181 2,430 1,029 1,302 1,302 1,302 2,318 2,121 2,394 2,667 1,125 1,423 1,722 2,020 2,318 2,617 2,915 1,225 1,550 1,875 2,199 2,524 2,849 3,174 1,329 1,682 2,034 2,387 2,739 3,992 3,444 2,200 2,581 2,963 3,344 3,725 2,307 2,784 3,195 3,606 4,017 2,552 2,994 3,436 3,878 4,320 2,737 3,211 3,686 4,160 4,634 2,960 2,737 3,211 3,686 4,160 4,634 5,060 2,929 3,437 3,944 4,452 4,960 2,929 3,437 3,944 4,452 4,960 2,929 3,437 3,944 4,452 4,960 2,929 3,437 3,944 4,452 4,960 2,929 3,437 3,944 6,751 5,065 6,060 6,751					1,076	1,302	1,527		1,979	2,204	2,430	2,655	2,881	3,107	3,332	3,558	3,784	4,009	4,235	4,460	4,686
1,029 1,302 1,575 1,846 2,121 2,394 2,667 2,940 3,213 3,786 4,09 4,09 4,09 4,09 4,09 6,09 5,00 5,00 5,00 5,00 5,00 5,00 5,00 5	1,029 1,302 1,302 2,1318 2,121 2,394 2,667 1,125 1,423 1,722 2,020 2,318 2,617 2,915 1,225 1,550 1,875 2,199 2,524 2,849 3,174 1,329 1,682 2,034 2,387 2,739 3,949 3,444 2,200 2,581 2,963 3,344 3,725 2,307 2,784 3,195 3,606 4,017 2,552 2,994 3,436 3,878 4,320 2,737 3,211 3,686 4,160 4,634 2,960 2,737 3,211 3,686 4,160 4,634 2,960 2,929 3,437 3,944 4,452 4,960 2,929 3,437 3,944 4,452 4,960 2,929 3,437 3,944 4,452 4,960 2,929 3,437 3,944 6,754 5,296 5,643 2,965 5,643 2,960 6,751					1,187	1,435	1,684		2,181	2,430	2,679	2,928	3,176	3,425	3,674	3,923	4,171	4,420	4,669	4,918	5,166
1,125 1,423 1,722 2,020 2,318 2,617 $\frac{1}{2}$ 2,949 3,213 3,512 3,810 4,109 4,407 4,705 5,004 5,302 5,600 5,899 1,225 1,520 1,875 2,199 2,524 2,849 3,174 3,179 4,108 4,869 5,123 5,207 5,529 5,123 5,448 5,777 5,129 2,200 2,249 3,493 3,402 3,444 3,172 4,128 4,189 4,805 5,207 5,529 5,013 6,394 6,197 7,175 7,159 2,233 2,333 2,344 3,125 3,606 4,101 4,128 4,128 4,189 5,221 5,622 5,013 6,914 6,919 7,141 7,128 1,128 1,129 1,121 1,121 1,141 1	1,125 1,423 1,722 2,020 2,318 2,617 2,915 1,225 1,550 1,875 2,199 2,524 2,849 3,174 1,329 1,682 2,034 2,387 2,739 3,092 3,444 2,200 2,581 2,963 3,344 3,725 2,373 2,784 3,195 3,606 4,017 2,552 2,994 3,436 3,878 4,320 2,737 3,211 3,686 4,160 4,634 2,929 3,437 3,944 4,452 4,960 2,929 3,437 3,944 6,754 5,296 5,643 5,065 5,643 5,370 6,001 5,781 6,000 6,060 6,751					1,302	1,575	1,848		2,394	2,667	2,940	3,213	3,486	3,759	4,032	4,305	4,578	4,851	5,124	5,397	5,670
1,225         1,875         2,189         2,524         2,849         3,174         3,489         4,414         4,474         4,799         5,123         5,448         5,773         6,096         6,423           1,329         1,682         2,034         2,884         2,895         3,444         3,797         4,489         4,869         5,503         5,503         5,912         6,484         6,895         7,307         7,188         6,617         6,895         7,307         7,188         8,129           2,552         2,934         3,496         4,107         4,686         5,231         6,033         6,934         6,895         7,307         7,188         8,129           2,552         2,934         3,496         4,616         4,634         5,106         5,231         6,036         6,531         6,974         7,416         7,898         8,309         8,428         8,309         8,428         8,309         8,428         8,309         8,428         8,309         8,482         8,909         9,378         8,239         8,482         8,909         6,938         6,938         6,936         6,531         6,934         7,498         8,005         8,531         8,006         8,548         8,938	1,225 1,550 1,875 2,199 2,524 2,849 3,174 1,329 1,682 2,034 2,387 2,739 3,092 3,444 2,200 2,581 2,963 3,344 3,725 2,373 2,784 3,195 3,606 4,017 2,552 2,994 3,436 3,878 4,320 2,737 3,211 3,686 4,160 4,634 2,929 3,437 3,944 4,452 4,960 4,754 5,296 5,643 5,065 6,001 5,787 6,001 6,060 6,751					1,423	1,722	2,020		2,617	2,915	3,213	3,512	3,810	4,109	4,407	4,705	5,004	5,302	2,600	5,899	6,197
1,329 1,682 2,034 2,387 2,739 3,944 3,797 4,108 4,502 4,854 5,207 5,539 6,913 6,264 6,617 6,596 2,200 2,281 2,293 3,344 3,725 4,106 4,488 4,889 5,225 6,013 6,484 6,895 7,307 7,178 8,129 2,232 2,294 3,436 3,878 4,320 5,484 6,380 6,322 7,065 7,481 7,955 8,429 8,300 8,744 2,292 3,437 3,941 4,422 4,960 5,467 5,788 6,328 6,328 6,328 6,328 6,328 6,328 6,328 6,328 6,328 6,328 6,328 6,328 8,238	1,329 1,682 2,034 2,387 2,739 3,092 3,444 2,200 2,581 2,963 3,344 3,725 2,373 2,784 3,195 3,606 4,017 2,552 2,994 3,436 3,878 4,320 2,737 3,211 3,686 4,160 4,634 2,929 3,437 3,944 4,452 4,960 4,754 5,296 5,643 5,001 5,787 3,001 5,788 6,370 6,060 6,751					1,550	1,875			2,849	3,174	3,499	3,824	4,149	474,4	4,799	5,123	5,448	5,773	6,098	6,423	6,748
2,200         2,581         2,963         3,344         3,725         4,166         4,486         5,251         5,622         6,073         6,484         6,775         7,157         7,158         8,129         2,373         2,737         2,734         3,446         3,725         4,486         5,251         5,662         6,073         6,484         6,734         7,416         7,816         8,129         2,737         7,718         8,129         2,737         7,718         8,129         2,737         7,718         8,129         2,737         7,718         8,129         8,739         8,748         8,739         8,748         8,739         8,748         8,739         8,748         8,739         8,748 <td< th=""><th>2,200 2,581 2,963 3,344 3,725 2,373 2,784 3,195 3,606 4,017 2,552 2,994 3,436 3,878 4,320 2,737 3,211 3,686 4,160 4,634 2,929 3,437 3,944 4,452 4,960 4,754 5,296 5,065 5,065 5,063 5,370 6,001 5,718 6,370 6,060 6,751</th><th></th><th></th><th></th><th></th><th></th><th>2,034</th><th></th><th></th><th>3,092</th><th>3,444</th><th>3,797</th><th>4,149</th><th>4,502</th><th>4,854</th><th>5,207</th><th>5,559</th><th>5,912</th><th>6,264</th><th>6,617</th><th>6,969</th><th>7,322</th></td<>	2,200 2,581 2,963 3,344 3,725 2,373 2,784 3,195 3,606 4,017 2,552 2,994 3,436 3,878 4,320 2,737 3,211 3,686 4,160 4,634 2,929 3,437 3,944 4,452 4,960 4,754 5,296 5,065 5,065 5,063 5,370 6,001 5,718 6,370 6,060 6,751						2,034			3,092	3,444	3,797	4,149	4,502	4,854	5,207	5,559	5,912	6,264	6,617	6,969	7,322
2,373         2,784         3,195         3,606         4,017         4,488         6,251         5,667         6,073         6,484         6,895         7,307         7,718         8,129           2,552         2,994         3,436         3,878         4,320         4,763         5,205         5,647         6,089         6,571         6,974         7,416         7,856         8,709         9,788           2,522         2,994         3,436         4,160         4,634         5,109         5,583         6,057         6,532         7,006         7,481         7,955         8,429         8,904         9,378           2,929         3,437         3,944         4,452         4,960         5,487         6,920         7,464         8,006         8,513         9,090         8,682         10,036         10,141         10,036         10,141         10,036         10,141         10,036         10,141         10,036         10,141         10,036         10,141         10,036         10,141         10,036         10,281         10,948         10,948         10,948         10,948         10,948         10,948         10,948         10,948         10,948         10,948         10,948         10,948         10,948	2,373 2,784 3,195 3,606 4,017 2,552 2,994 3,436 3,878 4,320 2,737 3,211 3,686 4,160 4,634 2,929 3,437 3,944 4,452 4,960 4,754 5,296 5,065 5,065 5,083 5,387 6,001 5,718 6,370 6,060 6,751	-					2,200			3,344	3,725	4,106	4,488	4,869	5,250	5,632	6,013	6,394	6,775	7,157	7,538	7,919
2,552       2,994       3,436       4,720       4,763       5,265       5,647       6,089       6,531       6,930       7,481       7,955       8,409       8,742         2,737       3,211       3,686       4,160       4,634       5,109       5,583       6,057       6,990       7,481       7,955       8,492       8,904       9,378         2,929       3,437       3,944       4,452       4,960       5,467       5,975       6,482       6,990       7,481       7,955       8,482       8,904       9,378         2,929       3,437       3,944       4,452       4,960       5,467       5,975       6,482       6,990       7,464       8,006       8,548       9,009       9,632       10,716	2,552 2,994 3,436 3,878 4,320 2,737 3,211 3,686 4,160 4,634 2,929 3,437 3,944 4,452 4,960 4,754 5,296 5,065 5,643 5,387 6,001 5,718 6,370 6,060 6,751						2,373	2,784		3,606	4,017	4,428	048,4	5,251	5,662	6,073	484,9	6,895	7,307	7,718	8,129	8,540
2,737 3,211 3,686 4,160 4,634 5,109 5,583 6,057 6,482 6,990 7,496 8,005 8,513 9,021 9,528 10,036 2,922 3,437 3,944 4,452 4,960 5,467 5,975 6,482 6,990 7,496 8,005 8,548 9,090 9,632 10,174 10,716 5,065 5,643 6,220 6,798 7,376 7,944 8,458 9,090 9,632 10,174 10,116 11,419 5,387 6,001 6,615 7,230 7,844 8,458 9,072 9,686 10,201 10,915 11,529 12,143 5,718 6,300 6,050 6,751 7,441 8,132 8,832 9,514 10,205 10,896 11,587 12,278 12,999 13,660 6,751 7,441 8,132 8,832 9,514 10,205 10,896 11,587 12,278 12,999 13,660 8,360 6,751 7,441 8,132 8,861 10,633 11,405 12,177 12,949 13,721 14,493 15,266 8,772 9,586 10,401 11,215 12,030 12,844 13,659 14,473 15,287 16,102 9,240 10,997 10,955 11,813 12,671 13,529 14,387 15,245 16,103 16,990 17,841 16,919 17,841 16,919 17,841 16,919 17,841 16,919 17,841 18,132 12,617 13,529 14,387 15,245 16,103 16,990 17,841 18,120 12,120 12,132 15,134 16,037 16,939 17,841	2,737 3,211 3,686 4,160 4,634 2,929 3,437 3,944 4,452 4,960 4,754 5,296 5,065 5,643 5,387 6,001 5,718 6,370 6,060 6,751						2,552	2,994	3,436	3,878	4,320	4,763	5,205	2,647	680,9	6,531	4/6,9	7,416	7,858	8,300	8,742	9,184
2,929 3,437 3,944 4,452 4,960 5,467 5,975 6,482 6,990 7,496 8,005 8,513 9,021 9,522 10,176 10,716 5,065 5,643 6,226 5,838 6,380 6,922 7,464 8,006 8,548 9,090 9,632 10,174 10,716 5,065 5,643 6,220 6,798 7,376 7,936 8,458 9,072 9,686 10,263 10,841 11,419 11,419 5,387 6,001 6,615 7,230 7,844 8,458 9,072 9,686 10,301 10,915 11,529 12,143 5,718 6,306 6,751 7,441 8,132 8,832 9,514 10,205 10,896 11,587 12,278 12,999 13,660 6,751 7,441 8,132 8,832 9,514 10,205 10,896 11,587 12,278 12,999 13,660 8,364 0,935 10,066 10,797 11,528 12,299 13,721 14,492 15,268 15,249 13,721 14,493 15,268 15,249 13,721 14,493 15,268 15,240 10,997 10,955 11,813 12,671 13,529 14,387 15,249 15,149 15	2,929 3,437 3,944 4,452 4,960 4,754 5,296 5,065 5,643 5,387 6,001 5,718 6,370 6,060 6,751						2,737	3,211		4,160	4,634	5,109	5,583	6,057	6,532	7,006	7,481	7,955	8,429	8,904	9,378	9,852
4,754         5,296         5,838         6,380         6,922         7,464         8,006         8,548         9,090         9,632         10,174         10,716           5,065         5,643         6,220         6,736         7,376         7,933         8,531         9,108         9,686         10,263         10,484         11,419           5,387         6,001         6,615         7,230         7,844         8,458         9,072         9,686         10,301         10,915         11,419           5,718         6,000         6,751         7,441         8,132         8,958         9,630         10,282         10,934         11,589         12,189           6,000         6,751         7,441         8,132         8,823         9,514         10,282         10,934         11,580         12,189         13,660           7,873         8,604         9,335         10,066         10,797         11,528         12,299         13,761         14,452           8,316         9,088         9,861         10,663         10,797         11,529         13,299         13,447         15,493         15,280           8,316         9,088         9,861         10,663         10,737	4,754 5,296 5,065 5,643 5,387 6,001 5,718 6,370 6,060 6,751						2,929	3,437		4,452	4,960	2,467	5,975	6,482	066,9	7,498	8,005	8,513	9,021	9,528	10,036	10,543
5,065 5,643 6,220 6,736 7,336 7,844 8,458 9,072 9,686 10,201 10,915 11,529 12,143 5,186 6,060 6,751 7,411 8,132 8,832 9,514 10,205 10,896 11,587 12,278 12,996 13,660 6,751 7,441 8,132 8,832 9,514 10,205 10,896 11,587 12,278 12,996 13,660 13,610 18,136 10,282 11,914 11,515 12,139 12,299 13,186 13	5,065 5,643 5,387 6,001 5,718 6,370 6,060 6,751									4,754	5,296	5,838	6,380	6,922	7,464	900,8	8,548	060,6	9,632	10,174	10,716	11,258
5,387 6,001 6,615 7,230 7,844 8,458 9,072 9,686 10,301 10,915 11,529 12,143 5,718 6,370 7,022 7,674 8,326 8,978 9,630 10,282 10,934 11,586 12,289 6,060 6,751 7,441 8,132 8,823 9,514 10,205 10,896 11,587 12,278 12,969 13,660 7,831 8,604 9,335 10,066 10,797 11,528 12,259 12,990 13,721 14,452 8,316 9,088 9,861 10,633 11,405 12,177 12,949 13,721 14,493 15,266 8,772 9,586 10,401 11,215 12,030 12,844 13,659 14,473 15,287 16,102 9,240 10,097 10,955 11,813 12,671 13,529 14,387 15,245 16,103 16,960 9,719 10,622 11,524 12,427 13,329 14,327 15,134 16,037 16,939 17,841	5,387 6,001 5,718 6,370 6,060 6,751									5,065	5,643	6,220	6,798	7,376	7,953	8,531	9,108	9,686	10,263	10,841	11,419	11,996
5,718 6,370 7,022 7,674 8,326 8,978 9,630 10,282 10,934 11,586 12,238 12,890 6,060 6,751 7,441 8,132 8,823 9,514 10,205 10,896 11,587 12,278 12,969 13,660 7,831 8,604 9,335 10,066 10,797 11,528 12,259 12,990 13,721 14,452 8,316 9,088 9,861 10,633 11,405 12,177 12,949 13,721 14,493 15,266 8,772 9,586 10,401 11,215 12,030 12,844 13,659 14,473 15,287 16,102 9,240 10,097 10,955 11,813 12,671 13,529 14,387 15,245 16,103 16,960 9,719 10,622 11,524 12,427 13,329 14,327 15,134 16,037 16,939 17,841	5,718 6,370 6,060 6,751									5,387	6,001	6,615	7,230	7,844	8,458	9,072	989,6	10,301	10,915	11,529	12,143	12,758
6,060 6,751 7,441 8,132 8,833 9,514 10,205 10,896 11,587 12,278 12,969 13,660 7,873 8,604 9,335 10,066 10,797 11,528 12,259 12,990 13,721 14,452 8,316 9,088 9,861 10,633 11,405 12,177 12,949 13,721 14,493 15,266 8,772 9,586 10,401 11,215 12,030 12,844 13,659 14,473 15,287 16,102 9,240 10,097 10,955 11,813 12,671 13,529 14,387 15,245 16,103 16,960 9,719 10,622 11,524 12,427 13,329 14,232 15,134 16,037 16,939 17,841	6,060 6,751									5,718	6,370	7,022	7,674	8,326	8,978	9,630	10,282	10,934	11,586	12,238	12,890	13,542
7,873 8,604 9,335 10,066 10,797 11,528 12,299 12,990 13,721 14,452 8,316 9,088 9,861 10,633 11,405 12,177 12,949 13,721 14,493 15,266 8,772 9,586 10,401 11,215 12,030 12,844 13,659 14,473 15,287 16,102 9,240 10,097 10,955 11,813 12,671 13,529 14,387 15,245 16,103 16,960 9,719 10,622 11,524 12,427 13,329 14,232 15,134 16,037 16,939 17,841										9,060	6,751	7,441	8,132	8,823	9,514	10,205	10,896	11,587	12,278	12,969	13,660	14,351
8,316 9,088 9,861 10,633 11,405 12,177 12,949 13,721 14,493 15,266 8,772 9,586 10,401 11,215 12,030 12,844 13,659 14,473 15,287 16,102 9,240 10,097 10,955 11,813 12,671 13,529 14,387 15,245 16,103 16,960 9,719 10,622 11,524 12,427 13,329 14,232 15,134 16,037 16,939 17,841												7,873	8,604	9,335	10,066	10,797	11,528	12,259	12,990	13,721	14,452	15,183
8,772 9,586 10,401 11,215 12,030 12,844 13,659 14,473 15,287 16,102 9,240 10,097 10,955 11,813 12,671 13,529 14,387 15,245 16,103 16,960 9,719 10,622 11,524 12,427 13,329 14,232 15,134 16,037 16,939 17,841												8,316	980,6	9,861	10,633	11,405	12,177	12,949	13,721	14,493	15,266	16,038
9,240 10,097 10,955 11,813 12,671 13,529 14,387 15,245 16,103 16,960 9,719 10,622 11,524 12,427 13,329 14,232 15,134 16,037 16,939 17,841												8,772	9,586	10,401	11,215	12,030	12,844	13,659	14,473	15,287	16,102	16,916
9,719 10,622 11,524 12,427 13,329 14,232 15,134 16,037 16,939 17,841												9,240	10,097	10,955	11,813	12,671	13,529	14,387	15,245	16,103	16,960	17,818
												9,719	10,622	11,524	12,427	13,329	14,232	15,134	16,037	16,939	17,841	18,744

 $<sup>\</sup>frac{1}{2}$  Diameter classes are midpoint; e.g. 12-inch class includes 11.0-12.9.

NOTE.--Block indicates extent of data.  $\frac{2}{2}$  The volume of a tree with a minimum saw log 8 inches d.i.b. and 12 feet long is 23 board feet. Trees lacking this minimum saw log have no Scribner volume.

Diameter breast height										F	Total heightFeet	thtFeet									
Inches 1	04	50	09	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
9	2	~	4	4	2	<b>S</b>	9	9	7	<b>0</b> 0	<b>a</b>	on.	6								
60	4	5	9	7	00	6	10	12	13	14	15	16	17								
2 01	7	6	10	12	14	15	17	19	20	22	24	76	2.7								
12	10	13	15	18	2.1	23	26	28	31	33	36	39	41								
14	14	18	22	25	29	32	36	04	43	47	15	54	58								
. 91	19	24	29	34	39	43	48	53	58	63	89	72	77								
18	25	31	37	44	20	99	62	89	75		87	93	100								
20	31	39	47	55	62	70	78	98	93	101	109	117	125	132	140	148					
22	38	48	57	67	76	98	95	105	114	124	133	143	153	162	172	181					
24	94	57	69	80	92	103	115	126	137	149	160	172	183	195	506	218					
26	54	89	81	95	108	122	135	149	163	176	190	203	217	230	244	257					
28		79	95	===	127	142	158	174	190	506	221	237	253	569	285	301					
30		16	110	128	146	164	183	201	219	237	256	274	292	310	329	347	365	384	707	420	438
32		104	125	146	167	188	500	230	251	272	292	313	334	355	376	397	418	439	459	780	501
34			142	166	189	213	237	260	284	308	332	355	379	403	426	4.50	474	497	521	545	895
36			160	187	213	240	267	293	320	346	373	004	426	453	480	905	533	260	586	613	049
38				209	238	268	298	328	358	387	417	447	477	507	536	995	965	979	959	685	715
04				232	265	298	331	364	397	431	494	497	530	563	965	629	662	969	729	762	795
42				256	293	330	366	403	439	476	513	549	586	623	659	969	732	769	908	842	879
44				282	322	363	403	443	484	524	564	409	645	685	725	99/	908	846	887	927	296
94				309	353	397	1441	486	530	574	618	662	90/	750	795	839	883	927	971	1,015	1,059
48				337	385	434	482	530	578	626	674	723	771	819	867	915	963	1,012	1,060	1,108	1,156
20				367	614	471	524	576	628	681	733	786 .	838	890	943	995	1,047	1,100	1,152	1,204	1,257
52						511	267	624	681	738	794	851	908	596	1,021	1,078	1,135	1,192	1,248	1,305	1,362
54						552	613	4/9	736	797	858	919	186	1,042	1,103	1,165	1,226	1,287	1,348	1,410	1,471
95						594	099	726	792	858	924	930	1,056	1,122	1,188	1,254	1,320	1,386	1,452	1,518	1,585
58						638	709	780	851	922	993	1,064	1,135	1,206	1,277	1,348	1,418	1,489	1,560	1,631	1,702
09						684	760	836	912	988	1,064	1,140	1,216	1,292	1,368	1,444	1,520	1,596	1,672	1,748	1,824
62									975	1,056	1,138	1,219	1,300	1,381	1,463	1,544	1,625	1,706	1,788	1,869	1,950
49									1,040	1,127	1,214	1,300	1,387	1,474	1,560	1,647	1,734	1,820	1,907	1,994	2,080
99									1,107	1,200	1,292	1,384	1,477	1,569	1,661	1,753	1,846	1,938	2,030	2,123	2,215
89									1,177	1,275	1,373	1,471	1,569	1,667	1,765	1,863	1,96,1	2,059	2,157	2,255	2,354
70									1,248	1,352	1,456	1,560	1,664	1,768	1,872	1,976	2,080	2,184	2,288	2,392	2,496
72											1,542	1,652	1,762	1,873	1,983	2,093	2,203	2,313	2,423	2,533	2,644
74											1,630	1,747	1,863	1,980	2,096	2,213	2,329	2,446	2,562	2,678	2,795
76											1,721	1,844	1,967	2,090	2,213	2,336	2,459	2,582	2,705	2,827	2,950
78											1,814	1,944	2,073	2,203	2,333	2,462	2,592	2,721	2,851	2,981	3,110
80											1,910	2,046	2,183	2,319	2,456	2,592	2,728	2,865	3,001	3,138	3,274

 $\frac{1}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

20 65 133 174 222 222 274 332 4			70   37   119   119   174   174   174   174   174   174   174   175   17	80 43 85 137 202 277 277 460 569	90 64	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
20 40 65 96 1133 174 222 274 332	-		37 73 119 240 240 315 399 493	43 85 137 202 277 363 460 569	64	1	62		ř	84										
20 40 65 96 1133 174 222 274 332	-		37 73 119 174 240 315 399 493	43 85 137 202 277 363 460 569	64	**	62		25	84										
40 65 96 1174 222 274 332			73 119 174 240 315 3399 597	85   202 277 363 460 569	20	25		69	٩		92	66								
65 133 174 222 274 332	-		119 174 240 315 399 493 711	137 202 277 363 460 569	16	109	121	134	148	191	175	189								
96 133 174 222 274 332			174 240 315 399 4493 711	202 277 363 460 569	157	176	196	217	237	259	280	303								
133 174 222 274 332	-		240 315 399 493 597	277 363 460 569	229	258	286	316	346	376	407	4 39								
174 222 222 274 332			315 399 493 597	363 460 569	315	353	392	432	473	514	925	599								
222 274 332			399 493 597 711	460	412	463	514	995	618	672	727	782	839	968	954					
274 332	·		493 597 711	569	523	586	651	716	783	850	919	989	1,060	1,132	1,204					
332	<del>-</del>		597		949	724	803	884	996	1,049	1,133	1,219	1,306	1,394	1,483					
	<del>-</del> -		111	889	781	875	971	1,068	1,167	1,267	1,369	1,472	1,577	1,683	1,790					
				819	929	1,041	1,155	1,270	1,387	1,506	1,626	1,748	1,872	1,998	2,125					
	÷		834	961 1	1,090	1,221	1,354	1,489	1,626	1,765	1,906	2,048	2,193	2,340	2,489	2,640	2,792	2,947	3,104	3,262
32 679	1,0		967 1,	1,114 1	1,263	1,415	1,569	1,725	1,883	2,044	2,207	2,372	2,539	2,709	2,880	3,054	3,231	3,409	3,590	3,773
34	1,0		1,109 1,		1,449	1,623	1,799	1,978	2,159	2,343	2,529	2,718	2,910	3,104	3,300	3,499	3,701	3,905	4,112	4,321
36		-	1,261 1,	1,453 1	1,647		2,045	2,248	2,454	2,662	2,874	3,088	3,305	3,525	3,748	3,974	4,203	4,434	4,668	4,905
38		6	1,423 1,		1,858		2,306	2,535	3,767	3,002	3,240	3,481	3,726	3,974	4,224	4,479	4,736	4,996	5,260	5,526
04		1,	1,595 1,	_	2,082	2,331	2,583	2,839	3,099	3,361	3,628	3,898	4,171	844,4	4,729	5,013	5,301	5,592	5,886	6,184
42		1,	1,776 2,		2,318		2,876	3,160	3,449	3,741	4,038	4,338	4,642	4,950	5,262	5,577	5,897	6,220	6,548	6,879
44		1,	1,967 2,	2,264 2	2,567	2,873	3,184	3,499	3,818	4,141	694,4	4,801	5,137	5,478	5,822	6,171	6,525	6,882	7,244	7,610
94		2,	2,167 2,	2,495 2	2,828			3,854	4,206	4,562	4,922	5,288	5,658	6,032	6,412	6,795	7,184	7,577	7,975	8,378
84		2,	2,377 2,	2,737 3	3,102	3,472	3,847	4,227	4,612	5,002	5,397	5,798	6,203	6,613	7,029	7,449	7,875	8,306	8,741	9,182
20		2,	2,597 2,	2,990 3	3,388	3,792	4,201	4,616	5,037	5,463	5,894	6,331	6,773	7,221	7,674	8,133	8,597	6,067	9,543	10,023
52				3	3,687	4,126	4,572	5,023	5,480	5,943	6,412	6,887	7,368	7,855	8,348	8,847	9,352	9,862	10,379	10,901
54				14	3,999		4,958	2,447	5,942	444,9	6,953	7,467	7,988	8,516	9,050	9,590	10,137	10,690	11,250	11,816
95				4	4,323	4,837	5,359	5,888	6,423	96'9	7,514	8,071	8,634	9,203	9,780	10,364	10,954	11,552	12,156	12,767
58				4	4,659	5,214	5,776	948,9	6,922	7,507	8,098	8,697	9,304	9,917	10,538	11,167	11,803	12,446	13,097	13,755
.09				5	600,5	5,605	6,209	6,821	7,440	8,063	8,704	9,347	966,6	10,658	11,325	12,000	12,683	13,374	14,073	14,780
62								7,313	7,977	8,650	9,331	10,020	10,718	11,425	12,140	12,863	13,595	14,335	15,084	15,841
49								7,822	8,532	9,251	9,980	10,717	11,463	12,218	12,983	13,756	14,538	15,330	16,130	16,939
99								8,348	9,106	9,873	10,650	11,437	12,233	13,039	13,854	14,679	15,513	16,357	17,211	18,074
89								8,891	9,698	20,515	11,343	12,180	13,028	13,885	14,753	15,631	16,520	17,418	18,326	19,245
70								9,452	10,309	11,178	12,057	12,947	13,847	14,759	15,681	16,614	17,558	18,512	19,477	20,453
72·										11,860	12,793	13,737	14,692	15,659	16,637	17,626	18,627	19,639	20,663	21,698
74										12,563	13,550	14,550	15,561	16,585	17,621	18,668	19,728	20,800	21,884	22,980
76										13,286	14,330	15,386	16,456	17,538	18,633	19,741	20,861	21,994	23,139	24,298
78										14,029	15,131	16,246	17,375	18,518	19,673	20,843	22,025	23,221	24,430	25,653
80										14,792	15,954	17,130	18,320	19,524	20,742	21,974	23,221	24,481	25,756	27,044

 $\frac{1}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Top diameter, variable Stump height, 1 foot

Stump and top excluded

011 001 06	80 90 100 110 120	100 110	110		120		130	140	150	160	170	180	190	200	210	220	230	240
	9 2	51	116	73	152	95 071	106	206	129	240								
	132	158	184	210	236	262	288	314	340	367								
	192	228	797	300	335	371	407	442	478	514								
. 4	263	310	357	403	450	497	544	590	637	684	730	777	824					
1	344	403	462	521	580	639	669	758	817	876	935	446	1,053					
4	434	207	580	653	726	799	872	546	1,018	1,091	1,164	1,237	1,310					
- 10	534	623	711	799	887	976	1,064	1,152	1,240	1,328	1,417	1,505	1,593					
9	945	749	854	959	1,064	1,169	1,274	1,379	1,484	1,588	1,693	1,798	1,903					
	292	888	1,010	1,133	1,256	1,379	1,502	1,625	1,748	1,871	1,994	2,117	2,240	2,363		2,608	2,731	2,854
80	895	1,037	1,179	1,322	1,464	1,606	1,749	1,891	2,034	2,176	2,318		2,603	2,746	2,888	3,030	3,173	3,315
1,034	34	1,198	1,361	1,524	1,687	1,851	2,014	2,177	2,340	2,504	2,667	2,830	2,993	3,157	3,320	3,483	3,647	3,810
1,184	84	1,369	1,555	1,741	1,926	2,112	2,297	2,483	2,668	2,854	3,039	3,225		3,596	3,782	3,967	4,153	4,338
1,3	1,343	1,553	1,762	1,971	2,180	2,390	2,599	2,808	3,017	3,227	3,436	3,645	3,854	490 4	4,273	4,482	4,691	4,901
1,513	13	1,747	1,981	2,216	2,450	2,684	2,919	3,153	3,388	3,622	3,856				4,794	5,028	5,262	5,497
1,692	32	1,953	2,214	2,475	2,735	2,996	3,257	3,518	3,779	4,040	4,301	4,561	4,822	5,083	5,344	5,605	5,866	6,127
1,881	81	2,170	2,459	2,747	3,036	3,325	3,614	3,902	4,191	4,480	4,769	5,058	5,346	5,635		6,213	6,502	6,790
2,0	2,080	2,398	2,716	3,034	3,352	3,671	3,989	4,307	4,625	4,943	5,261	5,579	5,897	6,215	6,534	6,852	7,170	7,488
2,	2,289	2,638	2,986	3,335	3,684	4,033	4,382	4,731	5,080	5,428	5,777	6,126	6,475	6,824		7,522	7,870	8,219
2,	2,507	2,888	3,269	3,650	4,031	4,412	4,793	5,174	5,555	5,936	6,317	869'9	7,079	7,460		8,222	8,603	8,984
			3,565	3,980	4,394	4,809	5,223	5,638	6,052	194,9 .	6,882	7,296	7,711	8,125		8,954	9,369	9,784
			3,873	4,323	4,772	5,222	5,671	6,121	6,571	7,020	7,470	7,919	8,369	8,818	9,268	9,717	10,167	10,616
			4,194	4,680	5,166	5,652	6,138	6,624	7,110	7,596	8,082	8,568	9,053	9,539		10,511	10,997	11,483
			4,528	5,052	5,575	660,9	6,623	7,147	7,670	8,194	8,718		9,765	10,289	10,812	11,336	11,860	12,383
			4,874	5,437	000,9	6,563	7,126	7,689	8,252	8,815	9,378	9,940	10,503	11,066	11,629	12,192	12,755	13,318
						7,044	7,647	8,251	8,854	9,458	10,061	10,665	11,268	11,872	12,475	13,079	13,682	14,286
						7,542	8,187	8,833	9,478	10,124	10,769	11,415	12,060	12,706	13,351	13,997	14,642	15,288
						8,056	8,745	9,434	10,123	10,812	11,501	12,190	12,879	13,568	14,257	14,946	15,635	16,324
						8,588	9,322	10,055	10,789	11,523	12,257	12,991	13,724	14,458	15,192	15, 726	16,659	17,393
						9,136	9,916	10,696	11,476	12,256	13,036	13,816	14,596	15,376	16,156	16,936	17,716	18,496
								11,357	12,185	13,012	13,840	14,668	15,495	16,323	17,151	17,978	18,806	19,634
								12,038	12,914	13,791	14,668	15,544	16,421	17,298		19,051	19,928	20,805
								12,738	13,665	14,592	15,519	16,446	17,374	18,301	19,228	20,155	21,082	22,010
								13,458	14,437	15,416	16,395	17,374	18,353	19,332		21,290	22,269	23,248
								14, 197	15.230	16.262	17.294	18.327	19.359	20,391	21,424	22 456	22 688	163 76

 $\frac{17}{2}$  Diameter classes are midpoint; e.g. 12-inch class includes 11.0-12.9.

NOTE.--Block indicates extent of data.  $\frac{2}{1}$  The volume of a tree with a minimum saw log 8 inches d.i.b. and 12 feet long is 23 board feet. Trees lacking this minimum saw log have no Scribner volume.

	90 22 31 411 53 66 88 88 88 96 113 113 113 113 113 113 113 113 113 11	100 100 117 125 146 168 168 192 244 244	6 6 110 12 27 38 80 117 117 118 118 1185 239	120	130	140	150	160	170	180	190	200	210	220	230	
2 3 4 4 4 4 5 6 7 7 8 10 12 10 12 15 17 14 17 21 24 18 23 29 36 44 51 36 44 53 62 43 53 64 74 50 63 75 88 73 88 102 84 101 118 96 115 134 146 171 146 171 257	5 15 22 31 41 41 113 113 113 113 113 113 113 11	6 10 17 25 46 46 195 195 195 195 244 244 244	6 12 19 27 27 38 50 64 64 117 117 118 160 160 160 239	7	∞ .	œ										240
2 3 4 4 4 4 5 6 7 7 8 10 12 10 12 15 17 11 17 21 24 118 23 27 32 23 29 36 44 51 36 44 53 62 43 53 64 74 50 63 75 88 73 88 102 84 101 118 96 115 134 146 171 146 171 257	22 31 411 53 66 80 80 80 113 113 113 113 113 113 113 113 113	6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	6 12 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	7	00	x										
10 12 15 17 17 18 10 12 19 19 19 19 19 19 19 19 19 19 19 19 19	15 113 113 113 113 113 113 113 113 113 1	10 17 17 17 18 19 19 19 19 19 19 19 19 19 19	12 27 27 50 64 117 138 160 160 239			> 4	ກ ,	ם ן								
7 8 10 12 10 12 15 17 14 17 21 24 18 23 27 32 23 29 36 44 51 36 44 53 62 43 53 64 74 50 63 75 88 73 88 102 84 101 118 96 115 134 136 152 146 171 146 171	22 31 411 53 66 80 80 80 113 113 113 113 113 113 113 113 113 11	17 25 46 46 106 1125 1146 1168 1168 117 244	19 27 27 50 64 117 117 118 239	-33	14	15	16	1/								
10 12 15 17 14 17 21 24 18 23 29 35 44 36 44 53 62 43 53 64 74 50 63 75 88 73 88 102 84 101 118 96 115 134 130 152 146 171 146 171 234	22 31 41 53 66 80 80 96 113 113 173 173 173	25 46 46 73 73 89 106 116 116 116 116 117 244	27 38 50 64 117 117 118 239	20	22	24	25	27								
14 17 21 24 18 23 27 32 23 29 36 44 51 36 44 53 62 43 53 64 74 50 63 75 88 73 88 102 84 101 118 96 115 134 130 152 146 171 212 212 212	31 41 41 55 80 80 96 96 113 113 113 113 113 113 113 113 113 11	35 46 59 73 89 106 125 146 192 244 244	38 50 64 117 117 118 118 1185 239	30	32	35	37	04								
18 23 27 32 23 29 36 44 51 36 44 53 62 43 53 64 74 50 63 75 88 102 84 101 118 96 115 134 130 152 146 191 212	53 66 80 80 96 113 113 173 173	46 59 73 89 106 125 146 192 244	50 64 80 117 138 160 160 239	42	45	48	52	55								
29	53 66 80 96 113 131 151 173 195 219	59 73 106 106 1168 192 217 244	64 80 117 118 160 160 211 239	55	09	49	69	73								
29 36 44 51 36 44 53 62 43 53 64 74 50 63 75 88 102 84 101 118 96 115 134 130 152 146 171 146 171 212	66 80 96 113 131 151 173 195 219	73 89 106 125 146 192 244 244	80 98 117 138 160 160 211 239	70	76	82	88	94								
36 44 53 62 43 53 64 74 50 63 75 88 73 88 102 84 101 118 96 115 134 146 171 146 171 146 234 234	80 96 111 131 151 173 195 219	106 106 125 146 168 192 244	98 117 138 160 185 211 239	87	95	102	109	117	124	131	139					
43 53 64 74 50 63 75 88 102 84 101 118 96 115 134 146 171 146 171 212 234 257	96 113 131 151 173 195 219	106 125 146 168 192 217 244	117 138 160 185 211	107	115	124	133	142	151	160	169					
50 63 75 88 102 84 101 118 96 115 134 152 152 153 154 151 151 151 151 151 151 151 151 151	113 131 151 173 195 219	125 146 168 192 217 244	138 160 185 211 239	128	138	149	159	170	181	191	202					
73 88 102 84 101 118 96 115 134 130 152 146 171 146 191 212 234 257	131 151 173 195 219	146 168 192 217 244	160 185 211 239	150	163	175	188	200	213	225	238					
84 101 118 96 115 134 130 152 146 171 212 234 257	151 173 195 219	168 192 217 244	185 211 239	175	190	204	219	233	248	263	277					
96 115 134 130 152 146 171 146 171 191 212 234 257	173	192 217 244	211	202	218	235	252	269	286	302	319	336	353	370	386	403
146 171 191 191 212 234 257	195	217	239	230	549	268	288	307	326	345	364	383	403	422	441	460
146 171 191 212 234 257	219	244		260	282	304	326	347	369	391	412	434	456	477	499	521
212 212 234 257			268	293	317	341	366	390	415.	439	463	488	512	536	561	585
212 234 257	245	272	299	327	354	381	408	436	463	490	517	545	572	599	626	653
234	272	302	332	363	393	423	453	484	514	544	574	409	635	999	.569	725
257	300	334	367	401	434	467	501	534	267	601	634	899	701	734	768	801
	330	367	404	044	477	514	550	587	624	099	269	734	770	807	844	881
921	361	402	442	482	522	562	602	642	683	723	763	803	843	883	924	964
306 350	394	438	482	525	569	613	657	700	744	788	832	876	919	963	1,007	1,051
	428	9/4	523	571	618	999	713	761	808	856	904	156	666	1,046	1,094	1,141
52	463	515	566	618	699	721	772	824	875	927	978	1,030	1,081	1,133	1,184	1,236
54	200	556	611	299	723	778	834	889	945	1,001	1,056	1,112	1,167	1,223	1,279	1,334
256	539	598	658	718	778	838	868	957	1,017	1,077	1,137	1,197	1,257	1,316	1,376	1,436
	578	642	707	177	835	899		1,028	1,092	1,156	1,221	1,285	1,349	1,413	1,478	1,542
. 09	619	688	757	826	894	963	1,032	1,101	1,170	1,238	1,307	1,376	1,445	1,514	1,582	1,651
62				882	926	1,029	1,103	1,176	1,250	1,323	1,397	1,470	1,544	1,617	1,691	1,765
. 49				941	1,019	1,098	1,176	1,254	1,333	1,411	1,490	1,568	1,646	1,725	1,803	1,882
99			-		1,085	1,168	1,251	1,335	1,418	1,502	1,585	1,669	1,752	1,835	1,919	2,002
89			-	J	1,152	1,241	1,329	1,418	1,506	1,595	1,684	1,772	1,861	1,950	2,038	2,127
70			_	1,128	1,221		1,409	1,503	1,597	1,691	1,785	1,879	1,973	2,067	2,161	2,255
72						1	1,492	1,591	1,691	1,790	1,890	1,989	2,089	2,188	2,288	2,387
4						1,472	1,577	1,682	1,787	1,892	1,997	2,102	2,207	2,313	2,418	2,523
76						1,553		1,775	1,886	1,997	2,108	2,219	2,330	2,440	2,551	2,662
60						1,637		1,870	1,987	2,104	2,221	2,338	2,455	2,572	2,689	2,806
80						1,722	L	1,968	2,091	2;214	2,338	2,461	2,584	2,707	2,830	2,953

 $\frac{1}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

1.   1.   1.   1.   1.   1.   1.   1.	Diameter breast height											Total hel	Total heightFeet									
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	out ide bark inches 17	04	50	09	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
1   1   1   1   1   1   1   1   1   1	:		!		-	0.7	i.	3	;	ć	10	Ì										
14   15   15   15   15   15   15   15	12	17	17	54	740	86	60	113	127	143	160	178	197	217								
15   10   10   10   10   10   10   10	141	49	80	98	115	134	153	174	195	218	241	266	293	321								
142   141   244   259   345	16	_		140	991	192	219	247	276	306	338	372	407	444								
14.5   14.6	18			191	224	259	295	332	370	410	451	464	539	586								
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	20		]	248	162	336	382	429	477	527	579	633	689	747	808	871	936					
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	22			312	367	422	479	538	865	999	723	687	857	928	1,001	1,077	1,156					
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	24			384	451	519	588	659	732	908	883	962	1,044	1,128	1,215	1,305	1,398					
466         549         644         700         838         13,43         1,426         1,526         1,704         1,864         1,704         1,864         1,704         1,864         1,704         1,864         1,704         1,864         1,704         1,864         1,704         1,864         1,704         1,864         1,874 <th>26</th> <th></th> <th></th> <th>463</th> <th>543</th> <th>625</th> <th>707</th> <th>792</th> <th>879</th> <th>296</th> <th>1,058</th> <th>1,152</th> <th>1,248</th> <th>1,347</th> <th>1,449</th> <th>1,555</th> <th>1,663</th> <th></th> <th></th> <th></th> <th></th> <th></th>	26			463	543	625	707	792	879	296	1,058	1,152	1,248	1,347	1,449	1,555	1,663					
	30,14	4		645	449	740	838	937	1,039	1,143	1,249	1,358	1,470	1,586	1,704	1,826	1,951					
617   743   817   1.000   1.131   1.244   1.399   1.537   1.576   1.302   2.245   2.175   2.145   2.175   2.145   2.175   2.145   2.175   2.146   2.175   2.146   2.175   2.146   2.175   2.146   2.175   2.146   2.175   2.146   2.175   2.147   2.146   2.146   2.146   2.146   2.146   2.147   2.	3.0			643	753	865	979	1,095	1,213	1,333	1,456	1,582	1,711	1,843	1,979	2,119	2,262	2,410	2,562	2,719	2,881	3,048
Sept   1,1144   1,293   1,145   1,595   1,175   1,916   2,179   2,246   2,246   2,177   2,132   3,124   3,133   3,134   3,133   3,134   3,13	32	9		743			1,131	1,264	1,399	1,537	1,678	1,822	1,969	2,120	2,275	2,433	2,596	2,763	2,935	3,112	3,294	3,482
966 1,131 11,129 1,1467 1639 1,199 2,173 2,193 2,194 2,193 3,194 3,143 2,194 3,423 2,194 3,423 2,194 4,106 4,131 4,106 4,147 4,608 4,106 4,417 4,106 4,107 4	34			851			1,293	1,445	1,599	1,756	1,916	2,079	2,246	2,416	2,591	2,770	2,953	3,141	3,334	3,532	3,736	3,945
1,1274 1,462 1,562 1,844 2,039 2,237 2,493 2,2644 2,853 3,067 3,284 3,507 3,758 4,450 4,450 1,460 4,417 4,680 4,420 5,727 1,632 1,632 2,239 2,239 2,239 2,239 2,239 3,794 4,686 4,436 4,378 4,680 4,491 5,480 5,777 1,723 2,010 2,220 2,736 3,007 4,381 4,08 4,187 5,292 5,377 5,298 2,198	36						1,467	1,638	1,813	1,990	2,170	2,353	2,541	2,732	2,927	3,127	3,332	3,542	3,757	3,978	4,205	4,437
1,425 1,635 1,847 2,061 2,232 2,736 3,049 2,2724 3,548 3,543 3,794 4,066 4,437 6,468 4,691 5,180 5,492 5,727 1,185 1,180 2,190 2,270 2,270 2,232 2,738 3,340 3,567 3,340 3,568 4,289 4,066 4,431 4,066 4,437 5,079 5,999 5,180 5,180 2,190 5,180 2,190 5,180 2,190	3.8				,		1,652	1,844	2,039	2,237	2,439	2,644	2,853	3,067	3,284	3,507	3,735	3,968	4,206	4,451	4,701	4,958
1,585 1,818 2,053 2,293 2,575 3,024 3,575 3,575 4,480 4,478 4,060 4,331 4,608 5,381 5,180 5,180 5,175 5,177 1,173 2,110 5,124 2,173 3,170 3,181 3,180 3,179 3,180 5,180	14)			1,			1,847	2,061	2,279	2,499	2,724	2,952	3,184	3,421	3,662	3,908	4,160	4,417	4,680	4,950	5,225	5,508
1,735 2,010 2,270 2,532 2,798 3,307 3,340 3,618 3,900 4,186 4,476 4,776 5,079 5,389 5,705 6,095 6,956 6,956 1,955 1,930 2,112 2,498 2,786 3,077 3,373 3,672 4,389 4,022 4,381 4,781 5,109 6,356 6,299 6,456 6,899 7,211 7,600 2,115 2,424 2,736 3,929 3,856 4,939 6,456 6,438 6,898 7,324 7,192 7,829 8,939 8,498 8,881 8,109 8,499 8,478 3,109 2,499 6,357 6,710 7,192 7,629 8,898 8,898 8,898 8,989 3,999 4,202 6,399 6,399 6,399 8,499 8,499 8,499 8,499 8,540 8,587 6,740 8,587 8,789 8,898 8,898 8,898 8,898 8,999 8,499	î,			-,			2,053	2,291	2,532	2,776	3,024	3,276	3,533	3,794	4,060	4,331	4,608	4,891	5,180	5,475	5,777	6,087
1,1910 2, 2,12 2,498 2,786 3,077 3,563 4,020 4,381 4,285 4,598 4,917 5,242 5,573 5,910 6,525 6,685 7,211 7,600 2,386 3,291 3,570 3,651 3,770 3,653 4,743 5,109 5,480 5,829 5,377 5,730 6,030 6,456 6,830 7,211 7,600 2,386 3,292 3,576 4,376 4,735 5,192 5,548 5,828 5,729 6,730 6,030 6,456 6,830 7,211 7,600 2,386 3,519 3,932 4,736 3,193 5,192 5,192 5,548 5,828 5,829 6,731 7,192 7,122 8,032 8,702 8,340 8,383 8,707 9,185 9,871 1,190 1,1	7.5			-			2,270	2,532	2,798	3,067	3,340	3,618	3,900	4,186	4,478	4,776	5,079	5,389	5,705	6,027	6,357	6,694
2,115         2,424         2,736         3,621         3,737         4,620         4,383         4,743         5,109         5,480         5,377         5,730         6,090         6,496         6,496         6,496         7,491         7,784         7,784         5,109         5,480         5,875         6,240         6,692         7,204         7,784         7,784         8,296         6,375         6,724         7,777         8,236         8,206         8,206         8,206         8,248         8,787         8,186         8,206         8,206         8,206         8,486         8,881         9,214         9,671         1,199         1,190         1,190         9,417         7,194         8,086         9,134         7,719         8,218         8,707         9,186         9,671         1,199         9,417         1,199         9,417         1,199         9,417         1,199         9,417         1,199         9,417         1,199         9,417         1,199         9,418         9,418         9,671         1,199         9,417         9,418         9,821         9,417         9,417         9,417         9,417         9,417         9,417         9,417         9,417         9,417         9,417         9,417 <td< th=""><th>44</th><th></th><th></th><th>1,</th><th></th><th></th><th>2,498</th><th>2,786</th><th>3,077</th><th>3,373</th><th>3,672</th><th>3,976</th><th>4,285</th><th>4,598</th><th>4,917</th><th>5,242</th><th>5,573</th><th>5,910</th><th>6,255</th><th>909'9</th><th>6,965</th><th>7,331</th></td<>	44			1,			2,498	2,786	3,077	3,373	3,672	3,976	4,285	4,598	4,917	5,242	5,573	5,910	6,255	909'9	6,965	7,331
2,308 2,646 2,986 3,329 3,676 4,027 4,383 4,743 5,109 5,480 5,897 6,240 6,629 7,026 7,430 7,842 8,262 8,262 8,363 8,367 8,364 8,328 4,375 4,328 4,328 4,328 6,102 6,438 6,103 7,324 7,777 8,128 7,762 8,188 8,202 8,388 8,202	Ø'₁ Ø'₁			2,			2,736	3,051	3,370	3,693	4,020	4,351	4,688	5,029	5,377	5,730	060'9	954.9	6,830	7,211	7,600	7,996
3,246         3,619         3,995         4,376         4,762         5,548         5,949         6,377         6,777         7,192         7,620         8,056         8,056         8,056         8,056         8,056         8,056         8,056         8,056         8,056         8,056         8,056         8,056         8,056         8,005         8,043         6,438         6,734         7,777         8,286         9,017         9,186         9,017         9,186         9,017         9,186         9,017         9,186         9,017         9,186         9,017         9,186         9,017         9,186         9,017         9,186         9,017         9,186         9,017 <td< th=""><th>7</th><th></th><th></th><th>2,</th><th></th><th></th><th>2,986</th><th>3,329</th><th>3,676</th><th>4,027</th><th>4,383</th><th>4,743</th><th>5,109</th><th>5,480</th><th>5,857</th><th>6,240</th><th>6,629</th><th>7,026</th><th>7,430</th><th>7,842</th><th>8,262</th><th>8,691</th></td<>	7			2,			2,986	3,329	3,676	4,027	4,383	4,743	5,109	5,480	5,857	6,240	6,629	7,026	7,430	7,842	8,262	8,691
3,517 3,920 4,328 4,739 5,150 5,500 6,400 6,906 7,419 7,899 8,386 8,881 8,707 9,185 9,671 1,190 1,417 1,190 1,237 1,190 1,190 1,237 1,190	>,						3,246	3,619	3,995	4,376	4,762	5,152	5,548	646'5 .	6,357	6,771	7,192	7,620	8,056	8,500	8,953	9,414
3,799 4,234 4,673 5,117 5,566 6,020 6,480 6,946 7,419 7,899 8,386 8,881 9,386 10,417 4,092 4,560 5,032 5,992 6,479 6,973 7,473 7,890 8,495 9,017 9,547 10,086 10,633 11,190 4,395 4,898 5,404 5,916 6,433 6,956 7,448 8,020 8,563 9,113 9,671 10,237 11,991 6,337 6,890 7,449 8,014 8,586 9,165 9,772 10,348 10,952 11,597 11,991 7,223 7,851 8,485 9,127 9,775 11,097 11,770 12,453 13,145 13,204 14,561 7,687 8,355 9,029 9,710 10,399 11,096 11,770 12,453 13,145 13,384 14,561 7,687 8,856 9,127 9,775 11,047 11,047 11,690 12,453 13,145 15,414 16,413 8,166 8,874 9,590 10,312 11,042 11,087 11,097 11,097 11,770 12,453 13,145 15,414 16,413 8,166 8,874 9,590 10,312 11,042 11,086 15,724 14,086 15,705 16,537 17,380 10,761 11,372 12,225 13,086 13,275 14,085 15,724 14,089 15,744 16,609 17,486 18,375 11,372 12,000 12,899 13,806 14,723 15,649 17,469 18,465 19,473 20,498 21,525	45						3,517	3,920	4,328	4,739	5,156	5,578	900,9	6,438	6,878	7,324	7,777	8,238	8,707	9,185	9,671	10,166
4,092         4,560         5,032         5,992         6,473         6,973         7,473         7,890         8,495         9,017         9,547         10,086         10,633         11,190           4,395         4,898         5,404         5,916         6,433         6,956         7,485         8,020         8,563         9,113         9,671         10,237         10,812         11,397         11,991           6,773         6,337         6,890         7,449         8,014         8,586         9,165         9,752         10,348         10,952         11,597         11,991         11,991         11,991         11,991         11,991         11,991         11,991         11,992         11,991         11,992         11,991         11,992         11,991         11,992         11,991         11,992         11,991         11,992         11,991         11,992         11,991         11,992         11,991         11,992         11,991         11,992         11,991         11,992         11,991         11,992         11,992         11,992         11,992         11,992         11,992         11,992         11,992         11,992         11,992         11,992         11,992         11,992         11,992         11,992 <td< th=""><th>26</th><th></th><th></th><th></th><th></th><th></th><th>3,799</th><th>4,234</th><th>4,673</th><th>5,117</th><th>995'5</th><th>6,020</th><th>6,480</th><th>946,9</th><th>7,419</th><th>7,899</th><th>8,386</th><th>8,881</th><th>9,384</th><th>9,896</th><th>10,417</th><th>10,947</th></td<>	26						3,799	4,234	4,673	5,117	995'5	6,020	6,480	946,9	7,419	7,899	8,386	8,881	9,384	9,896	10,417	10,947
4,395         4,898         5,404         5,916         6,433         6,936         7,485         8,020         8,563         9,113         9,671         10,237         10,812         11,397         11,991           6,337         6,337         6,890         7,449         8,014         8,586         9,165         9,752         10,348         10,952         11,565         12,187         11,991           7,223         7,363         7,953         8,517         9,171         9,788         10,414         11,047         11,690         12,342         13,004         13,677           7,687         8,354         9,127         9,775         10,432         11,047         11,690         12,433         13,145         13,647         13,677           8,166         8,374         9,729         9,775         10,432         11,047         11,690         12,433         13,734         14,718         14,561           8,166         8,374         9,729         9,710         10,332         11,096         11,801         12,433         13,784         14,817         14,417           8,166         8,374         9,529         10,312         11,042         11,386         12,403         14,406         14,88	53						4,092	4,560	5,032	5,509	5,992	6,479	6,973	7,473	7,890	8,495	9,017	2,547	10,086	10,633	11,190	11,757
6,773	69						4,395	4,898	5,404	5,916	6,433	956'9	7,485	8,020	8,563	9,113	1/9'6	10,237	10,812	11,397	11,991	12,596
6.773 7,363 7,959 8,561 9,171 9,788 10,414 11,047 11,690 12,342 13,004 13,677 7,223 7,687 8,485 9,127 9,775 10,432 11,097 11,770 12,453 13,145 13,848 14,561 14,617 11,617	£ 2									6,337	068,9	7,449	8,014	8,586	9,165	9,752	10,348	10,952	11,565	12,187	12,820	13,463
7,223 7,687 8,355 9,029 9,710 10,399 11,096 11,801 12,516 13,239 13,145 13,848 14,561 15,473 8,166 8,874 9,590 10,312 11,042 11,780 12,527 13,284 14,050 14,827 15,614 16,413 10,761 11,569 12,386 13,775 14,075 14,885 15,746 16,413 11,372 12,225 13,086 13,275 14,885 15,744 16,609 17,486 18,375 12,000 12,899 13,806 14,723 15,649 16,586 17,534 18,493 19,464 20,448 12,609 17,548 19,462 19,397 12,645 13,549 14,746 16,489 15,744 18,493 19,464 20,448 12,649 16,484 17,749 18,493 19,464 20,448 12,649 16,484 17,749 18,493 19,464 20,448 12,649 18,462 19,473 20,498 12,526	49									6,773	7,363	7,959	8,561	171,6	9,788	10,414	11,047	11,690	12,342	13.004	13,677	14,360
7,687 8,355 9,029 9,710 10,399 11,096 11,801 12,515 13,239 13,973 14,718 15,473 8,166 8,874 9,590 10,312 11,042 11,780 12,527 13,284 14,050 14,827 15,614 16,413 10,167 10,932 11,704 12,485 13,275 14,075 14,885 15,705 16,537 17,380 10,761 11,569 12,386 13,211 14,045 14,889 15,744 16,609 17,486 18,375 12,000 12,899 13,806 14,723 15,649 16,586 17,534 18,493 19,464 20,448 12,645 13,551 14,546 15,510 16,484 17,469 18,465 19,473 20,498 21,526	99									7,223	7,851	8,485	9,127	9,775	10,432	11,097	11,770	12,453	13,145	13,848	14,561	15,285
8,166 8,874 9,590 10,312 11,042 11,780 12,527 13,284 14,050 14,827 15,614 16,413 10,167 10,932 11,704 12,485 13,275 14,075 14,885 15,705 16,537 17,380 10,761 11,569 12,386 13,211 14,045 14,889 15,744 16,609 17,486 18,375 11,372 12,225 13,086 13,957 14,836 15,726 16,627 17,538 18,462 19,397 12,000 12,899 13,806 14,723 15,649 16,586 17,534 18,493 19,464 20,448 12,645 19,473 20,493 21,526	68									7,687	8,355	9,029	9,710	10,399	11,096	11,801	12,516	13,239	13,973	14,718	15,473	16,240
10,167 10,932 11,704 12,485 13,275 14,075 14,885 15,705 16,537 17,380 10,761 11,569 12,386 13,211 14,045 14,889 15,744 16,609 17,486 18,375 17,380 11,372 12,225 13,086 13,957 14,836 15,726 16,627 17,538 18,462 19,397 12,000 12,899 13,806 14,723 15,649 16,586 17,534 18,493 19,464 20,448 12,645 19,473 20,493 21,526	2.									8,166	8,874	9,590	10,312	11,042	11,780	12,527	13,284	14,050	14,827	15,614	16,413	17,223
10,761 11,569 12,386 13,211 14,045 14,889 15,744 16,609 17,486 18,375 11,372 12,225 13,086 13,957 14,836 15,726 16,627 17,538 18,462 19,397 12,000 12,899 13,806 14,723 15,649 16,586 17,534 18,493 19,464 20,448 12,645 19,473 20,493 21,526	72											10,167	10,932	11,704	12,485	13,275	14,075	14,885	15,705	16,537	17,380	18,235
11,372 12,225 13,086 13,957 14,836 15,726 16,627 17,538 18,462 19,397 12,000 12,899 13,806 14,723 15,649 16,586 17,534 18,493 19,464 20,448 12,645 19,473 20,493 21,526	14/											10,761	11,569	12,386	13,211	14,045	14,889	15,744	16,609	17,486	18,375	19,276
12,000 12,899 13,806 14,723 15,649 16,586 17,534 18,493 19,464 20,448 12,645 19,473 20,493 21,526 12,645 13,591 14,546 15,510 16,484 17,469 18,465 19,473 20,493 21,526	76											11,372	12,225	13,086	13,957	14,836	15,726	16,627	17,538	18,462	19,397	20,346
12,645 13,591 14,546 15,510 16,484 17,469 18,465 19,473 20,493 21,526	or r											12,000	12,899	13,806	14,723	15,649	16,586	17,534	18,493	19,464	20,448	21,445
	40											12,645	13,591	14,546	15,510	16,484	17,469	18,465	19,473	20,493	21,526	22,573

 $\frac{1}{M}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. MATE.--815:: indicates extent of data.

40 50 60 70 80 90 100 110 120	60 70 80 90 100 110	70 80 90 100 110	80 90 100 110	011 001 06	100	110		120		130	Total hei	Total heightFeet	160	170	180	190	200	210	220	230	240
25 31 37 43 49 55 61 67	37 43 49 55 61	43 49 55 61	. 49 55 61	. 25 61	. 19		67		74	80	98	92	86								
58 69 81 92 104 116	69 81 92 104	81 92 104	92 104 116	104	116	٢	127		139	150	162	173	185								
91 109 128 146 164 182	109 128 146 164 182	128 146 164 182	146 164 182	164 182	182		201		219	237	255	274	292								
131 157 183 210 236 262	157 183 210 236 262	183 210 236 262	210 236 262	236 262	262		12	288	314	341	367	393	419								
177 212 248 283 319 354	212 248 283 319 354	248 283 319 354	283 319 354	319 354	354			389	425	460	964	531	566	602	637	673					
229 275 321 367 413	275 321 367 413	321 367 413	367 413	413		459		505	550	596	642	688	734	780	826	872					
282 353 424 494 565 635 706	424 494 565 635	403 461 518	565 635	516		3/6		777	847	918	988	1.059	922	9/9	1,03/	1,094					
509 594 679 764 848	509 594 679 764 848	594 679 764 848	679 764 848	764 848	848				1,018	1,103	1,188	1,273	1,357	1,442	1,527	1,612					
502 602 702 803 903 1,003 1,	602 702 803 903 1,003 1	702 803 903 1,003 1	803 903 1,003 1	903 1,003 1	1,003	_	-	,104	1,204	1,305	1,405	1,505	1,606	1,706	1,806	1,907	2,007	2,107	2,208	2,308	2,408
586 703 820 937 1,054 1,171 1,	703 820 937 1,054 1,171	820 937 1,054 1,171 1	937 1,054 1,171 1	1,054 1,171 1	1,171	_	1,	,288	1,405	1,522	1,640	1,757	1,874	1,991	2,108	2,225	2,342	2,459	2,577	2,694	2,811
1,081 1,216 1,351	946 1,081 1,216 1,351	946 1,081 1,216 1,351	1,081 1,216 1,351	1,216 1,351	1,351	_	7.	1,487	1,622	1,757	1,892	2,027	2,162	2,297	2,433	2,568	2,703	2,838	2,973	3,108	3,243
1,390 1,544	1,081 1,235 1,390 1,544	1,081 1,235 1,390 1,544	1,235 1,390 1,544	1,390 1,544	1,544		1	1,699 1	1,853	2,008	2,162	2,316	2,471	2,625	2,780	2,934	3,089	3,243	3,397	3,552	3,706
1,575 1,750	1,400 1,575 1,750	1,400 1,575 1,750	1,400 1,575 1,750	1,575 1,750	1,750	لجر	,-	,925	2,100	2,275	2,450	2,625	2,800	2,975	3,150	3,325	3,500	3,675	3,849	4,024	4,199
	1,574 1,771 1,968	1,574 1,771 1,968	1,574 1,771 1,968	1,771 1,968	1,968		2,1		2,361	2,558	2,755	2,952	3,149	3,345	3,542	3,739	3,936	4,132	4,329	4,526	4,723
1,539 1,759 1,979 2,198 2,418	1,759 1,979 2,198	1,759 1,979 2,198	1,759 1,979 2,198	1,979 2,198	2,198		2,4		2,638	2,858	3,078	3,298	3,518	3,737	3,957	4,177	4,397	4,617	4,837	5,057	5,276
1,953 2,198 2,442	1,953 2,198 2,442	1,953 2,198 2,442	1,953 2,198 2,442	2,198 2,442	2,442		5,6	-	2,930	3,174	3,418	3,663	3,907	4,151	4,395	4,639	4,883	5,128	5,372	5,616	5,860
2,158 2,428 2,698	2,158 2,428 2,698	2,158 2,428 2,698	2,158 2,428 2,698	2,428 2,698	2,698		2,96		3,237	3,507	3,777	940,4	4,316	4,586	4,856	5,125	5,395	5,665	5,935	6,204	6,474
2,373 2,669 2,966	2,373 2,669 2,966	2,373 2,669 2,966	2,373 2,669 2,966	2,669 2,966	2,966		3,2		3,559	3,856	4,152	644,4	4,746	5,045	5,339	. 5,636	5,932	6,229	6,525	6,822	7,119
3,247	2,598 2,922 3,247	2,598 2,922 3,247	2,598 2,922 3,247	2,922 3,247	3,247		3,5		3,897	4,221	4,546	4,871	5,195	5,520	5,845	6,170	6,494	6,819	7,144	7,468	7,793
3,187 3,541 3,	3,541	3,541	3,541	3,541	3,541		ຕົ⊸	3,895 1	4,249	4,603	4,957	5,311	5,665	6,019	6,373	6,727	7,082	7,436	7,790	8,144	8,498
4,166	4,166	4,166	4,166	4,166	4,166				666.4	5.416	5,832	6.249	6,665	7.082	7.499	7,915	8.332	8,748	9, 165	9.581	9,998
4,497	4,497	4,497	4,497	4,497	4,497		-7		5,397	5,846	6,296	94/49	7,196	7,645	8,095	8,545	8,995	9,444	9,894	10,344	10,793
4,357 4,841 5,	4,841	4,841	4,841	4,841	4,841		ŝ	5,325	5,810	6,294	6,778	7,262	7,746	8,230	8,714	9,199	9,683	10,167	10,651	11,135	11,619
									6,238	6,757	7,277	7,797	8,317	8,837	9,356	9,876	10,396	10,916	11,435	11,955	12,475
									6,681	7,237	7,794	8,351	8,907	6,464	10,021	10,578	11,134	11,691	12,248	12,805	13,361
									7,139	7,734	8,329	8,924	9,518	10,113	10,708	11,303	11,898	12,493	13,088	13,683	14,278
									7,612	8,246	8,881	9,515	10,149	10,784	11,418	12,053	12,687	13,321	13,956	14,590	15,224
									8,101	8,776	9,451	10,126	10,801	11,476	12,151	12,826	13,501	14,176	14,851	15,526	16,201
											10,038	10,755	11,472	12,189	12,906	13,623	14,340	15,057	15,774	16,491	17,208
											10,643	11,403	12,164	12,924	13,684	14,444	15,205	15,965	16,725	17,485	18,246
											11,266	12,071	12,875	13,680	14,485	15,290	16,094	16,899	17,704	18,508	19,313
											11,906	12,757	13,607	14,458	15,308	16,159	17,009	17,859	18,710	19,560	20,411
											12,564	13,462	14,359	15,257	16,154	17,052	17,949	18,847	19,744	20,641	21,539
Vision III																					

 $\frac{1}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Table 10.—Cubic-foot volume of lodgepole pine

Top diameter, 4 inches Stump height, 1 foot

e.		and			uded
- 2	cump.	and	COD	exc i	uaca

Diameter reast height							Total he	lghtFe	eet				
inches_	40	50	60	70	80	90	100	110	120	130	140	150	160
,		4		_	6	6	6						
6 8	3 6		5 8	5 9	10	11	12						
10		7 11	13	15	17	18	20	21	22	0.0		0.5	01
	9	16	7	22	25	27		31	22	23	23	25	26
12 14	17	21	19	3	34		29	43	33 46	34 48	35	36	38
16	22	28	34	30	] 44	37 49	54	43 58	62		50 68	52	53
18	28	35	7 42	49	57	63	69	74		65 84	88	71	73
		32 44		61	70	78	86	1	79			92	95
20	35 42		63	٦.	84		104	93	99	105	111	116	120
22		53	_	74	101	95		113	121	129	136	143	148
24	50	63	75 88		118	113	125	135	146	155	164	172	180
26	59	74		103		133	147	160	172	184	194	204	214
28		86	103	120	137	154	171	186	201	214	227	240	251
30		98	118	137	157	177	196	215	232	248	263	277	291
32		112	134	156	179	201	223	245	265	283	301	318	334
34			151	177	202	227	252	277	300	322	342	361	380
36			170	198	226	254	283	311	338	362	385	408	429
38				221	252	284	315	347	378	405	431	457	481
40				244	279	314	349	384	419	450	480	508	536
42				269	308	346	385	423	462	498	531	563	593
44				296	338	380	422	465	507	548	585	620	654
46				323	369	415	462	508	554	600	641	680	718
48				352	402	452	503	553	603	653	700	743	784
50				382	436	491	545	600	654	709	761	808	854

 $<sup>\</sup>frac{1}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Table 11.—Board-foot volume of lodgepole pine by International 1/4-inch rule

Stump and top excluded

Top diameter, 6.5 inches

Diameter reast height utside bark							Total h	ightF	eet				
inches_1/	40	50	60	70	80	90	100	110	120	130	140	150	160
10	23	39	55	70	86	101	117						
12	43	66	88	110	133	155	178	200	223	245	268	290	313
14	68	98	129	159	190	221	251	282	312	343	374	404	435
16	97	137	177	217	257	297	337	377	417	457	497	537	577
18 .	132	183	233	284	334	385	436	486	537	587	638	688	739
20	172	234	297	359	421	484	546	609	671	734	796	859	921
22	216	292	367	443	519	594	670	745	821	896	972	1,048	1,123
24	266	356	446	536	626	716	805	895	985	1,075	1,165	1,255	1,345
26	321	426	532	637	743	848	954	1,059	1,165	1,270	1,376	1,482	1,587
28		503	625	747	870	992	1,115	1,237	1,359	1,482	1,604	1,727	1,849
30		585	726	866	1,007	1,147	1,288	1,428	1,569	1,709	1,850	1,990	2,131
32		674	834	994	1,154	1,314	1,474	1,634	1,793	1,953	2,113	2,273	2,433
34			950	1,131	1,311	1,491	1,672	1,852	2,033	2,213	2,394	2,574	2,755
36			1,073	1,276	1,478	1,680	1,883	2,085	2,287	2,490	2,692	2,894	3,097
38				1,430	1,655	1,881	2,106	2,331	2,557	2,782	3,008	3,233	3,459
40				1,592	1,842	2,092	2,342	2,592	2,841	3,091	3,341	3,591	3,841
42				1,764	2,039	2,315	2,590	2,865	3,141	3,416	3,692	3,967	4,242
1414				1,944	2,246	2,548	2,851	3,153	3,455	3,757	4,060	4,362	4,664
46				2,133	2,463	2,794	3,124	3,454	3,785	4,115	4,445	4,776	5,106
48				2,330	2,690	3,050	3,410	3,769	4,129	4,489	4,848	5,208	5,568
50				2,537	2,927	3,317	3,708	4,098	4,488	4,879	5,269	5,659	6,050

 $<sup>\</sup>frac{1}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Table 12.—Board-foot volume of lodgepole pine by Scribner rule in 16-foot logs to a utilized top

Stump and top ex	cluded										To S	p diamete	er, variable
Diameter breast height							Total h	elghtF	eet				
outside bark inches!/	40	50	60	70	80	90	100	110	120	130	140	150	160
12	27	48	68	89	110	130	151	172	192	213	234	254	275
14	48	76	104	132	160	188	216	244	272	301	329	357	385
16	73	109	146	183	220	256	293	330	367	403	440	477	513
18	102	149	195	242	288	335	381	428	474	521	567	614	660
20	137	194	252	309	366	424	481	538	596	653	711	768	825
22	176	245	315	384	453	523	592	662	731	801	870	940	1,009
24	219	302	384	467	550	632	715	798	880	963	1,046	1,128	1,211
26	267	364	461	558	655	752	849	946	1,043	1,140	1,237	1,334	1,431
28		432	545	657	770	882	995	1,107	1,220	1,332	1,445	1,557	1,670
30		506	636	765	894	1,023	1,152	1,281	1,410	1,539	1,669	1,798	1,927
32		586	733	880	1,027	1,174	1,321	1,468	1,615	1,761	1,908	2,055	2,202
34			837	1,003	1,169	1,335	1,501	1,667	1,832	1,998	2,164	2,330	2,496
36			949	1,135	1,320	1,506	1,692	1,878	2,064	2,250	2,436	2,622	2,808
38				1,274	1,481	1,688	1,895	2,103	2,310	2,517	2,724	2,931	3,138
40				1,421	1,651	1,880	2,110	2,340	2,569	2,799	3,028	3,258	3,487
42				1,577	1,830	2,083	2,336	2,589	2,842	3,095	3,348	3,601	3,854
44				1,740	2,018	2,296	2,573	2,851	3,129	3,407	3,684	3,962	4,240
46				1,912	2,215	2,519	2,822	3,126	3,430	3,733	4,037	4,340	4,644
48				2,091	2,422	2,752	3,083	3,413	3,744	4,075	4,405	4,736	5,066
50				2,279	2,637	2,996	3,355	3,713	4,072	4,431	4,789	5,148	5,507

 $<sup>\</sup>frac{1}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

1	1	Diameter breast height										F	Total heightFeet	ghtFeet									
1	1	ches_/	40	50	09	70	80	96	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
1	1																						
1	1	9	3	~	47	2	2	9	7	7	œ	σ	6	10	10								
1   1   1   1   1   1   1   1   1   1	15   14   15   15   15   15   15   15	80	2	9	7	00	10	=	12	13	14	15	16	17	19								
15   16   12   12   13   14   15   15   15   15   15   15   15	15   18   12   12   13   14   15   15   14   15   15   14   15   15	10	00	6	=======================================	13	15	17	18	20	22	24	26	27	29								
15   16   17   18   18   18   18   18   18   18	15   24   25   25   25   25   25   26   27   25   26   25   27   25   25   25   25   25   25	12	=	14	16	19	21	24	27	29	32	34	37	39	42								
19   24   24   25   25   25   25   25   25	19   24   25   25   25   25   25   25   25	4	15	18	22	26	29	33	36	740	43	47	20	54	57								
		9	19	24	29	33	38	43	47	52	95	19	65	70	74								
10   10   10   10   10   10   10   10	10   14   14   14   14   14   14   14	8	24	30	36	42	48	54	09	99	7.1	77	83	89	94								
1	1	50	30	38	45	52	09	19	74	81	88	98	102	109	116	123	130	137					
		22	36	45	54	63	72	81	90	98	107	115	124	132	141	149	157	165					
51   12   13   12   13   12   13   14   15   13   14   15   13   14   15   13   14   15   13   14   15   13   14   15   13   14   13   14   13   14   14   14	14   10   11   11   11   11   11   11	24	43	54	65	75	98	96	107	117	127	137	147	157	167	177	187	197					
74         68         102         117         131         145         159         153         187         209         214         228         214         228         214         228         214         228         214         229         214         228         214         229         214         228         214         228         228         228         214         228         228         228         228         228         228         228         228         239         415         415         416         418         418         418         228         228         228         228         228         228         228         239         418	14   18   14   18   18   18   18   18	26	51	63	9/	88	101	113	125	137	149	161	173	185	196	208	220	231					
1	84         101         118         134         150         166         183         134         224         224         226         227         375         474         465         475         474         465         475	28		74	88	102	117	131	145	159	173	187	200	214	228	241	255	268					
11   11   12   11   12   12   12   12	96   115   134   152   171   189   208   226   226   280   326   326   336   336   336   346   443   4	30		84	101	118	134	150	166	183	198	214	230	246	261	277	292	308	323	338	353	368	382
130   151   172   193   214   234   235   245   246   316   336   336   336   335   443	190   151   172   193   214   224   255   226   236   336   335   415   435   335   413   445   465	32		96	115	134	152	171	189	208	226	244	262	280	297	315	333	350	367	384	401	418	435
146   169   193   216   240   263   286   394   314   356   375   376   419   444   469   469   443   469   444   469   444   469   444   469   444   469   444   469   444   469   444   469   444   469   444   469   444   469   444   469   444   469   444   464	146   169   193   216   240   265   286   396   331   334   419   446   469   440   465   466   506   506   520   520   521   520   521	34			130	151	172	193	214	234	255	275	296	316	336	356	375	395	415	434	453	472	491
190   215   241   267   236   334   346   369   449   449   446   449	189   215   241   267   233   318   344   365   394   419   444   446   469	36			146	169	193	216	240	263	286	309	331	354	376	399	421	443	465	984	508	529	551
293         284         296         324         457         462         492         512         594         647         643         645         649         512         594         647         647         649         512         543         653         643         663         643         663         663         664         663         664         793         794         789         781           276         315         324         426         504         541         579         662         662         662         662         663         673         683         684         793         794         789         789         789         789         662         566         669         799         789	230         286         286         324         353         381         403         437         465         492         512         543         574         603         633         633         633         633         633         633         632         691         671         691         729         729         729         729         729         729         729         447         749         578         652         562         662         662         662         662         662         662         662         662         662         662         662         663 <td>38</td> <td></td> <td></td> <td></td> <td>189</td> <td>215</td> <td>241</td> <td>267</td> <td>293</td> <td>318</td> <td>344</td> <td>369</td> <td>394</td> <td>419</td> <td>444</td> <td>694</td> <td>493</td> <td>518</td> <td>545</td> <td>995</td> <td>590</td> <td>614</td>	38				189	215	241	267	293	318	344	369	394	419	444	694	493	518	545	995	590	614
230         284         326         356         451         462         543         573         663         673         663         664         679         662         684         727         759         791           233         288         333         358         393         467         467         467         569         659         659         669         669         669         669         669         709         718         787         786         864         864           310         313         365         426         569         659         669         669         709         718         866         998         864         869         864         869         869         679         689         679         689         679         789         789         869         869         789         789         789         869         989         1,005         1,105         1,105         1,105         1,105         1,105         1,105         1,105         1,105         1,105         1,105         1,105         1,105         1,105         1,101         1,105         1,105         1,105         1,105         1,105         1,101         1,105	230         263         264         326         358         389         420         451         542         542         573         603         663         694         773         579         529         562         569         694         773         759         579         579         560         694         773         759         759         579         579         560         694         774         779         759         579         560         694         776         778         789         685         699         709         748         787         789         696         699         709         748         787         789         686         909         709         748         787         789         687         689 <td>0+</td> <td></td> <td></td> <td></td> <td>209</td> <td>238</td> <td>267</td> <td>296</td> <td>324</td> <td>353</td> <td>381</td> <td>604</td> <td>437</td> <td>465</td> <td>492</td> <td>520</td> <td>247</td> <td>574</td> <td>601</td> <td>627</td> <td>654</td> <td>680</td>	0+				209	238	267	296	324	353	381	604	437	465	492	520	247	574	601	627	654	680
253         288         323         427         461         495         529         562         662         662         662         663         663         663         663         663         664         663         664         663         664         663         664         663         664         663         664         663         664         663         664 <td>253         288         333         427         461         495         529         562         659         662         669         709         773         759         794         773         789         789         683         726         789         864         709         748         789         889         989         989         989         989         883         786         789         887         947         894         989         989         989         989         989         883         786         789         887         947         899         989         989         989         989         989         887         947         899         989<td>42</td><td></td><td></td><td></td><td>230</td><td>263</td><td>294</td><td>326</td><td>358</td><td>389</td><td>420</td><td>451</td><td>482</td><td>512</td><td>543</td><td>573</td><td>603</td><td>633</td><td>662</td><td>691</td><td>721</td><td>750</td></td>	253         288         333         427         461         495         529         562         659         662         669         709         773         759         794         773         789         789         683         726         789         864         709         748         789         889         989         989         989         989         883         786         789         887         947         894         989         989         989         989         989         883         786         789         887         947         899         989         989         989         989         989         887         947         899         989 <td>42</td> <td></td> <td></td> <td></td> <td>230</td> <td>263</td> <td>294</td> <td>326</td> <td>358</td> <td>389</td> <td>420</td> <td>451</td> <td>482</td> <td>512</td> <td>543</td> <td>573</td> <td>603</td> <td>633</td> <td>662</td> <td>691</td> <td>721</td> <td>750</td>	42				230	263	294	326	358	389	420	451	482	512	543	573	603	633	662	691	721	750
276         315         353         391         467         504         541         578         615         651         687         752         759         759         864         709         748         785         669         709         748         789         864         865         903         941           301         343         385         426         467         556         589         629         669         709         748         789         869         894         895         894         897         947         947         947         897         947         947         947         947         949         948         966         1,105	276         315         353         391         467         504         541         578         615         667         769         748         787         789         629         669         709         748         787         886         993         93           301         343         385         467         569         659         669         769         748         886         996         993         990         980         990	41				253	288	323	358	393	427	461	495	529	562	965	629	662	469	727	759	791	823
311         343         365         462         569         659         709         748         787         826         865         939         941         990         1,021           327         372         417         462         596         643         649         683         786         884         896         938         940         1,021         1,022         1,125         1,121         1,021         1,122         1,022         1,132         1,231         1,431         1,431         1,431         1,432         1,432         1,432	311         343         385         426         467         589         629         669         709         748         787         886         989         989         989         989         989         989         989         989         980         989         980         989         980 <td>9+</td> <td></td> <td></td> <td></td> <td>276</td> <td>315</td> <td>353</td> <td>391</td> <td>429</td> <td>467</td> <td>504</td> <td>541</td> <td>578</td> <td>615</td> <td>651</td> <td>687</td> <td>723</td> <td>759</td> <td>794</td> <td>829</td> <td>864</td> <td>899</td>	9+				276	315	353	391	429	467	504	541	578	615	651	687	723	759	794	829	864	899
327 372 417 462 596 644 692 739 785 832 878 924 996 1,046 1,015 1,	327         372         417         462         567         551         596         639         683         726         769         812         876         896         936         980         980         980         980         980         1,015         1,060         1,143         970         1,143         872         874         897         847         896         1,046         1,143	84				301	343	385	426	194	508	549	589	629	699	709	748	787	826	865	903	941	979
451         500         548         596         644         692         739         785         832         878         970         10.05         1,105 <t< td=""><td>451         500         548         596         644         692         739         785         832         878         924         970         1,016         1,016         1,016         1,016         1,016         1,016         1,016         1,016         1,016         1,016         1,016         1,016         1,016         1,019         1,012         1,113         1,020         1,113         1,113         1,126         1,126         1,126         1,177         1,123         1,126         1,177         1,131         1,126         1,177         1,131         1,142</td><td>00</td><td></td><td></td><td></td><td>327</td><td>372</td><td>417</td><td>462</td><td>207</td><td>551</td><td>965</td><td>639</td><td>683</td><td>726</td><td>692</td><td>812</td><td>854</td><td>968</td><td>938</td><td>980</td><td>1,021</td><td>1,062</td></t<>	451         500         548         596         644         692         739         785         832         878         924         970         1,016         1,016         1,016         1,016         1,016         1,016         1,016         1,016         1,016         1,016         1,016         1,016         1,016         1,019         1,012         1,113         1,020         1,113         1,113         1,126         1,126         1,126         1,177         1,123         1,126         1,177         1,131         1,126         1,177         1,131         1,142	00				327	372	417	462	207	551	965	639	683	726	692	812	854	968	938	980	1,021	1,062
487         539         591         643         746         797         847         897         947         996         1,046         1,046         1,046         1,046         1,046         1,035         1,032         1,046         1,177         1,233         1,191         1,191         1,192         1,177         1,233         1,191         1,191         1,192         1,192         1,126         1,126         1,126         1,126         1,127         1,213         1,191         1,191         1,192         1,192         1,193         1,191         1,191         1,192         1,193         1,191         1,191         1,192         1,193         1,284         1,194         1,191         1,192         1,193         1,284         1,194         1,473         1,194         1,473         1,194         1,473         1,194         1,473         1,194         1,473         1,194         1,473         1,413	487         539         591         643         695         746         797         847         897         947         996         1,046         1,143           524         580         636         692         747         802         857         911         965         1,072         1,125         1,177         1,229           562         622         742         801         860         919         977         1,035         1,196         1,150         1,206         1,229         1,177         1,183           601         666         730         794         858         921         983         1,046         1,108         1,169         1,260         1,291         1,314         1,314         1,318         1,443         1,507         1,411         1,114         1,190         1,266         1,326         1,413         1,413         1,469         1,562         1,537         1,411           1020         1,101         1,183         1,263         1,423         1,423         1,469         1,562         1,584         1,771         1,839         1,462         1,584         1,771         1,839         1,462         1,974         1,771         1,872         1,462	.2						451	500	548	965	449	692	739	785	832	878	924	970	1,015	1,060	1,105	1,149
524         580         636         692         747         802         857         911         965         1,072         1,125         1,125         1,129         1,219         1,036         1,046         1,036         1,046         1,036         1,169         1,179         1,169         1,150         1,206         1,223         1,314         1,471         1,471         1,471         1,471         1,471         1,471         1,471         1,471         1,471         1,471         1,471         1,471         1,471         1,471         1,481         1,520         1,320         1,374         1,471         1,471         1,481         1,220         1,321         1,471         1,471         1,181         1,190         1,190         1,260         1,330         1,460         1,567         1,471         1,471         1,481         1,567         1,471         1,471         1,471         1,489         1,567         1,473         1,507         1,472         1,507         1,489         1,567         1,577         1,889         1,473         1,684         1,771         1,489         1,567         1,489         1,567         1,489         1,571         1,889         1,491         1,489         1,568         1,489	524         580         636         692         747         802         857         911         965         1,072         1,125         1,125         1,177         1,229           562         682         742         801         860         919         977         1,035         1,169         1,150         1,263         1,529         1,319         1,179         1,169         1,170         1,169         1,170         1,181         1,190         1,169         1,170         1,181         1,441         1,519         1,443         1,520         1,411         1,411         1,181         1,180         1,180         1,180         1,489         1,548         1,441         1,500         1,489         1,562         1,530         1,441         1,501         1,411         1,190         1,489         1,562         1,481         1,502         1,413         1,413         1,400         1,489         1,562         1,531         1,411         1,411         1,190         1,489         1,562         1,532         1,413         1,413         1,413         1,413         1,413         1,413         1,413         1,413         1,413         1,413         1,413         1,413         1,413         1,413         1,413	4.						487	539	591	643	695	942	797	847	897	246	966	1,046	1,094	1,143	1,191	1,239
562         622         742         801         860         919         977         1,035         1,196         1,156         1,156         1,263         1,263         1,196         1,108         1,169         1,263         1,269         1,196         1,108         1,169         1,269         1,196         1,183         1,248         1,374         1,411         1,411         1,183         1,248         1,248         1,443         1,507         1,471         1,411         1,183         1,246         1,183         1,248         1,248         1,443         1,507         1,471         1,411         1,183         1,248         1,248         1,560         1,570         1,471         1,471         1,183         1,248         1,248         1,560         1,577         1,471         1,471         1,483         1,562         1,560         1,570         1,471         1,471         1,483         1,560         1,570         1,473         1,570         1,473         1,570         1,473         1,570         1,473         1,570         1,483         1,500         1,771         1,883         1,483         1,500         1,530         1,493         1,500         1,500         1,500         1,500         1,500         1,500	562         622         742         801         860         919         977         1,035         1,150         1,150         1,150         1,266         1,150         1,150         1,150         1,261         1,319         1,191         1,104         1,405         1,504         1,504         1,507         1,403         1,403         1,403         1,403         1,403         1,403         1,403         1,504         1,504         1,904         2,052         2,146           1,004         1,107         1,104         1,104         1,506         1,506         1,507         1,604         1,771         1,803         1,904         2,072         2,04         2,04	99						524	580	989	692	747	802	857	911	965	1,018	1,072	1,125	1,177	1,229	1,281	1,332
601 666 730 794 858 921 983 1,046 1,108 1,114 1,183 1,244 1,184 1,197 1,183 1,246 1,136 1,1361 1,371 1,411 1,471 1,471 1,183 1,265 1,136 1,141 1,412 1,183 1,265 1,136 1,141 1,413 1,507 1,508 1,413 1,107 1,183 1,263 1,343 1,423 1,508 1,518 1	601         666         730         794         858         921         983         1,046         1,108         1,169         1,230         1,291         1,351         1,411           903         976         1,048         1,119         1,190         1,266         1,330         1,400         1,469         1,537         1,443         1,507           903         976         1,048         1,119         1,190         1,265         1,340         1,469         1,537         1,443         1,507           1,020         1,101         1,183         1,263         1,340         1,489         1,562         1,638         1,707           1,020         1,101         1,183         1,263         1,423         1,502         1,580         1,658         1,787         1,812         1,707           1,020         1,101         1,183         1,263         1,423         1,502         1,580         1,688         1,787         1,893         1,921           1,020         1,1081         1,183         1,423         1,502         1,580         1,688         1,787         1,894         2,042         2,146           1,400         1,496         1,591         1,688         1,	80						562	622	682	742	801	098	919	776	1,035	1,092	1,150	1,206	1,263	1,319	1,374	1,429
848       916       983       1,050       1,117       1,183       1,248       1,378       1,443       1,570       1,570         903       976       1,048       1,119       1,190       1,265       1,340       1,469       1,537       1,605       1,673         1,020       1,101       1,114       1,190       1,265       1,340       1,415       1,489       1,562       1,638       1,777       1,779         1,020       1,101       1,183       1,263       1,343       1,423       1,562       1,580       1,582       1,570       1,777       1,777         1,020       1,101       1,183       1,263       1,343       1,423       1,562       1,580       1,582       1,577       1,889         1,020       1,101       1,183       1,263       1,343       1,423       1,561       1,684       1,771       1,889       1,991       2,002         1,020       1,101       1,167       1,253       1,343       1,423       1,589       1,581       1,994       2,032       2,118         1,021       1,101       1,167       1,253       1,496       1,581       1,684       1,771       1,883       1,946       2,	848       916       983       1,050       1,117       1,183       1,248       1,314       1,378       1,443       1,507         903       976       1,048       1,119       1,190       1,260       1,330       1,469       1,562       1,635       1,605         1,020       1,101       1,183       1,263       1,340       1,415       1,489       1,562       1,638       1,707         1,020       1,101       1,183       1,263       1,423       1,502       1,680       1,688       1,787       1,812         1,020       1,101       1,183       1,263       1,423       1,628       1,580       1,688       1,787       1,812         1,081       1,167       1,253       1,343       1,423       1,598       1,674       1,787       1,819       1,921         1,081       1,167       1,253       1,346       1,591       1,674       1,777       1,889       1,946       2,052       2,146         1,400       1,496       1,591       1,688       1,778       1,876       2,079       2,182       2,283       2,402       2,509         1,537       1,748       1,777       1,879       1,976       2,07	00						601	999	730	794	858	921	983	1,046	1,108	1,169	1,230	1,291	1,351	1,411	1,471	1,530
903 976 1,048 1,119 1,126 1,265 1,340 1,469 1,562 1,635 1,707 1,779 1,020 1,020 1,101 1,118 1,25 1,340 1,423 1,508 1,511 1,615 1,812 1,818 1,921 1,001 1,101 1,118 1,256 1,416 1,506 1,591 1,674 1,777 1,819 1,911 1,001 1,400 1,496 1,511 1,817	903 976 1,048 1,119 1,190 1,260 1,330 1,400 1,469 1,552 1,505 1,707 1,020 1,101 1,183 1,263 1,340 1,423 1,502 1,580 1,658 1,736 1,812 1,081 1,167 1,253 1,343 1,423 1,508 1,591 1,674 1,757 1,893 1,921 1,326 1,496 1,597 1,686 1,777 1,885 1,487 1,984 2,032 1,400 1,496 1,597 1,685 1,778 1,871 1,984 2,055 2,146 1,477 1,578 1,677 1,876 1,974 2,071 2,168 2,264 1,576 1,677 1,876 1,976 2,079 2,182 2,283 2,385 1,587 1,789 1,989 2,078 2,187 2,295 2,402 2,509	52									848	916	983	1,050	1,117	1,183	1,248	1,314	1,378	1,443	1,507	1,570	1,633
961 1,038 1,114 1,190 1,265 1,340 1,415 1,489 1,562 1,635 1,707 1,779 1,779 1,020 1,020 1,101 1,183 1,263 1,343 1,423 1,502 1,501 1,674 1,757 1,839 1,921 2,002 1,081 1,167 1,253 1,338 1,423 1,508 1,591 1,674 1,777 1,839 1,946 2,032 2,118 1,400 1,496 1,591 1,689 1,777 1,887 1,914 2,037 2,118 1,477 1,578 1,877 1,876 1,976 2,077 2,168 2,264 2,359 1,946 2,327 1,477 1,578 1,877 1,876 1,976 2,077 2,168 2,264 2,359 1,685 1,687 1,777 1,876 1,977 2,077 2,168 2,264 2,359 2,485 1,687 1,778 1,877 1,878 1,877 1,878 1,877 2,077 2,182 2,283 2,385 2,485 1,687 1,778 1,877 1,876 2,077 2,182 2,283 2,485 1,687 1,788 1,877 1,878 1,877 2,077 2,182 2,283 2,485 2,485 1,687 1,788 1,877 1,878 1,877 2,195 2,187 2,295 2,402 2,509 2,614	961 1,038 1,114 1,190 1,265 1,340 1,415 1,489 1,562 1,563 1,707 1,020 1,101 1,183 1,263 1,343 1,423 1,502 1,580 1,658 1,736 1,812 1,081 1,167 1,253 1,343 1,423 1,508 1,591 1,674 1,757 1,839 1,921 1,326 1,416 1,566 1,595 1,684 1,771 1,859 1,946 2,032 1,400 1,496 1,591 1,685 1,778 1,871 1,964 2,055 2,146 1,477 1,578 1,677 1,876 1,974 2,071 2,168 2,264 1,575 1,677 1,876 1,974 2,071 2,168 2,264 1,576 1,677 1,876 1,976 2,079 2,182 2,283 2,385 1,567 1,778 1,879 1,979 2,182 2,283 2,385 1,567 1,778 1,879 1,979 2,187 2,295 2,402 2,509	54									903	926	1,048	1,119	1,190	1,260	1,330	1,400	1,469	1,537	1,605	1,673	1,740
1,020     1,101     1,183     1,263     1,433     1,423     1,502     1,503     1,517     1,639     1,921     2,002       1,081     1,167     1,253     1,338     1,423     1,508     1,591     1,674     1,757     1,839     1,921     2,002       1,326     1,416     1,506     1,595     1,684     1,771     1,889     1,946     2,032     2,118       1,400     1,496     1,591     1,685     1,778     1,871     1,964     2,055     2,146     2,237       1,477     1,578     1,678     1,777     1,876     1,974     2,071     2,168     2,264     2,359       1,566     1,676     1,767     1,876     1,976     2,079     2,182     2,283     2,485       1,637     1,778     1,876     2,078     2,187     2,295     2,402     2,509     2,614	1,020 1,101 1,183 1,263 1,343 1,423 1,502 1,580 1,658 1,736 1,812 1,081 1,167 1,253 1,338 1,423 1,508 1,591 1,674 1,757 1,839 1,921 1,326 1,416 1,566 1,595 1,684 1,771 1,859 1,946 2,032 1,400 1,496 1,591 1,685 1,778 1,871 1,964 2,055 2,146 1,477 1,578 1,677 1,876 1,974 2,071 2,168 2,264 1,577 1,876 1,974 2,071 2,168 2,264 1,576 1,976 2,079 2,182 2,283 2,385 1,567 1,788 1,879 1,969 2,078 2,187 2,295 2,402 2,509	99									196	1,038	1,114	1,190	1,265	1,340	1,415	1,489	1,562	1,635	1,707	1,779	1,851
1,081 1,167 1,253 1,338 1,423 1,508 1,591 1,674 1,757 1,839 1,921 2,002 1,326 1,416 1,506 1,595 1,684 1,771 1,859 1,946 2,032 2,118 1,400 1,496 1,591 1,685 1,778 1,871 1,964 2,055 2,146 2,237 1,477 1,578 1,678 1,777 1,876 1,977 2,071 2,168 2,264 2,359 1,556 1,662 1,767 1,872 1,976 2,079 2,182 2,283 2,385 2,485 1,563 1,748 1,859 1,969 2,078 2,187 2,295 2,402 2,509 2,614	1,081 1,167 1,253 1,338 1,423 1,508 1,591 1,674 1,757 1,839 1,921 1,326 1,416 1,566 1,595 1,684 1,771 1,859 1,946 2,032 1,400 1,496 1,591 1,685 1,778 1,871 1,964 2,055 2,146 1,477 1,578 1,677 1,876 1,974 2,071 2,168 2,264 1,575 1,687 1,777 1,876 1,974 2,071 2,168 2,264 1,556 1,662 1,767 1,872 1,976 2,079 2,182 2,283 2,385 1,567 1,748 1,859 1,969 2,078 2,187 2,295 2,402 2,509	89									1,020	1,101	1,183	1,263	1,343	1,423	1,502	1,580	1,658	1,736	1,812	1,889	1,965
1,326 1,416 1,506 1,595 1,684 1,771 1,859 1,946 2,032 2,118 1,400 1,496 1,591 1,685 1,778 1,871 1,964 2,055 2,146 2,237 1,477 1,578 1,678 1,777 1,876 1,974 2,071 2,168 2,264 2,359 1,556 1,662 1,767 1,872 1,976 2,079 2,182 2,283 2,385 2,485 1,563 1,748 1,859 1,969 2,078 2,187 2,295 2,402 2,509 2,614	1,326 1,416 1,506 1,595 1,684 1,771 1,859 1,946 2,032 1,400 1,496 1,591 1,685 1,778 1,871 1,964 2,055 2,146 1,477 1,578 1,677 1,876 1,974 2,071 2,168 2,264 1,556 1,662 1,767 1,872 1,976 2,079 2,182 2,284 2,057 1,548 1,859 1,969 2,078 2,187 2,295 2,402 2,509	70									1,081	1,167	1,253	1,338	1,423	1,508	1,591	1,674	1,757	1,839	1,921	2,002	2,082
1,400 1,496 1,591 1,685 1,778 1,871 1,964 2,055 2,146 2,237 1,477 1,578 1,678 1,777 1,876 1,974 2,071 2,168 2,264 2,359 1,556 1,662 1,767 1,872 1,976 2,079 2,182 2,283 2,385 2,485 1,637 1,748 1,859 1,969 2,078 2,187 2,295 2,402 2,509 2,614	1,400 1,496 1,591 1,685 1,778 1,871 1,964 2,055 2,146 1,477 1,876 1,974 2,071 2,168 2,264 1,578 1,678 1,777 1,876 1,974 2,071 2,168 2,264 1,556 1,662 1,767 1,872 1,976 2,079 2,182 2,283 2,385 1,637 1,748 1,859 1,969 2,078 2,187 2,295 2,402 2,509	72											1,326	1,416	1,506	1,595	1,684	1,771	1,859	1,946	2,032	2,118	2,203
1,477 1,578 1,678 1,777 1,876 1,974 2,071 2,168 2,264 2,359 1,556 1,662 1,767 1,872 1,976 2,079 2,182 2,283 2,385 2,485 1,637 1,748 1,859 1,969 2,078 2,187 2,295 2,402 2,509 2,614	1,477 1,578 1,678 1,777 1,876 1,974 2,071 2,168 2,264 1,556 1,662 1,767 1,872 1,976 2,079 2,182 2,283 2,385 1,637 1,748 1,859 1,969 2,078 2,187 2,295 2,402 2,509	74											1,400	1,496	1,591	1,685	1,778	1,871	1,964	2,055	2,146	2,237	2,327
1,556 1,662 1,767 1,872 1,976 2,079 2,182 2,283 2,385 2,485 1,637 1,748 1,859 1,969 2,078 2,187 2,295 2,402 2,509 2,614	1,556 1,662 1,767 1,872 1,976 2,079 2,182 2,283 2,385	9/											1,477	1,578	1,678	1,777	1,876	1,974	2,071	2,168	2,264	2,359	2,454
1,637 1,748 1,859 1,969 2,078 2,187 2,295 2,402 2,509 2,614	.1,637 1,748 1,859 2,078 2,187 2,295 2,402 2,509	78											1,556	1,662	1,767	1,872	1,976	2,079	2,182	2,283	2,385	2,485	2,585
		80											1,637	1,748	1,859	1,969	2,078	2,187	2,295	2,402	2,509	2,614	2,719

 $\frac{1}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

100 110 120 130 140		100 110 120 130 140	110 120 130 140	120 130 140	130 140	140			00		160	170	180	190	200	210	220	230	240
			103	119	180	169	137	255		316	390								
230	230	230		258	292	335	389	457			507 639 785								
404	404	404		446	496	556	628	716				1,096	1,271	1,475					
623	623	623		685	753	832	924	1,033			Γ	,493	1,702	1,944					
751 889	751 889	751 889		823 973	1,063	1,163	1,093	1,214	1,355	-	1,520	1,714	1,940	2,200					
	1,040 1,		-	1,135	1,237	1,348	1,474	1,618	1,784			2,201	2,459	2,756	3,097	3,485	3,924	4,419	4,974
1,202 1,310	1,202 1,3		1,3	01 00	1,424	1,548	1,686	1,842	2,021		2,228	2,466	2,741	3,056	3,417	3,828	4,292	4,815	5,401
_			1.6	2 80	1,839	1,988	2,151	2,333				3,042	3,349	3,700	4,100	4,555	5,068	5.646	6.293
7	7	7	1,91	0	2,066	2,229	2,405	2,601				3,352	3,675	4,044	4,463	4,939	5,476	6,080	6,756
ſ	ſ	ſ	2,139	10	2,306	2,483	2,674	2,883				3,676	4,016	4,402	048,4	5,337	5,897	6,527	7,232
			2,372		2,559	2,751	2,956	3,179				4,016	4,371	4,774	5,231	5,748	6,332	6,987	7,719
2,417 2,622	2,417 2,622		2,622		3 104	3,033	3,253	3,490	3,751		4,043 4	4,371	4,741	5, 161	5,637	6,174	6,779	7,459	8,219
			3,158		3,397	3,638	3,888	4,155				5,124	5,526	5,979	6,490	7,067	7,715	8,442	9,254
_	_	_	3,445		3,702	3,961	4,228	4,510	4,815		5,150 5	5,523	5,941	6,410	6,939	7,534	8,202	8,952	9.790
J	3,459 3,744	J	3,744	1	4,021	4,297	4,581	4,879	-	*		5,937	6,370	6,855	7,401	8,014	8,703	9,475	10,338
			4,056		4,353	4,648	4,948	5,262				6,366	6,814	7,315	7,877	8,509	9,217	10,011	10,897
4,362 4,716	4,362 4,716		4,716		4,690	5,012	5,726	6,073	6,440		6,835 7	7,268	7,746	8,278	8,873	9,539	10,286	11,121	12,053
-	-	-	5,065	1	5,427	5,781	6,136	6,500				7,741	8,234	8,781	9,392	10,075	10,840	11,695	12,649
						6,186	6,560	6,941	7,341			8,229	8,737	9,299	9,926	10,625	11,407	12,281	13,256
						6,605	6,998	7,398	L	-		8,732	9,255	9,832	10,473	11,189	11,988	12,881	13,876
						7,038	7,450	7,868					9,787	10,379	11,035	11,766	12,582	13,493	14,508
						7,484	7,917	8,353					10,334	10,940	11,611	12,357	13, 189	14,117	15,151
						7,944	8,398	8,853					10,896	11,516	12,201	12,962	13,810	356 " 10	1.,807
								9,367	9,851		10,356 10		11,473	12,107	12,806	13,581	14,444	15,405	16,475
								9,895	10,397			11,470	12,064	12,712	13,425	14,214	15,091	16,067	17,155
								10,438					12,670	13,331	14,057	14,860	15,751	16,743	17,846
				4				10,996	11,533			12,669	13,291	13,965	14,705	15,520	16,425	17,431	18,550
								0/1	~ 000		10 (0)	0000	700 01	16 616	376 -1	101 71	11 110		12.66

1/ Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9.
NOTE.--Block indicates extent of data.

40 50 60 70 80 90 100 110 120	60 70 80 90 100 110	70 80 90 100 110	80 90 100 110	100 110	011		120		130	Total heightFeet	htFeet 150	160	170	180	190	200	210	220	230	240
50 53 55 58 62 68 79	55 58 62 68	58 62 68	62 68		75		96	119	151	192	243	307								
77 85 92 99 108 119 135	92 99 108 119	99 108 119	108 119		135		158	187	226	275	336	411								
109 124 137 150 164 181 203	137 150 164 181	150 164 181	164 181		203		232	569	315	373	444	530								
147 170 190 209 230 255 284	190 209 230 255	209 230 255	230 255		284		320	364	419	486	267	499								
190 222 250 278 307 339 376	250 278 307 339	278 307 339	307 339		376		420	473	537	614	705	813	939	1,086	1,255					
239 281 319 356 394 435 481	319 356 394 435	356 394 435	394 435		481		534	965	699	756	857	976	1,115	1,275	1,458					
293 346 395 443 491 542 598	395 443 491 542	443 491 542	491 542		598		199	733	816	913	1,025	1,155	1,306	1,478	1,675					
352 418 480 539 599 660 727	480 539 599 660	539 599 660	299 669		727		800	883	217	1,084	1,208	1,349	1,512	1,696	1,906					
497 572 644 716 790 868	572 644 716 790	644 716 790	716 790		898		953	740,	1,152	1,271	1,405	1,559	1,732	1,929	2,152					
844 931 1,022 1	672 759 844 931 1,022 1	759 844 931 1,022 1	844 931 1,022 1	1,022	_	-	,119	,224	1,341	1,472	1,618	1,783	1,968	2,177	2,411	2,673	2,966	3,292	3,653	4,051
1,187	781 882 982 1,083 1,187	882 982 1,083 1,187	982 1,083 1,187	1,187	_		,297	914,	1,545	1,687	1,845	2,022	2,219	2,439	2,685	2,959	3,263	3,600	3,973	4,384
897 1,015 1,130 1,246 1,365 1,	1,015 1,130 1,246 1,365	1,015 1,130 1,246 1,365	1,130 1,246 1,365	1,365	-	-	1,489	1,621	1,763	1,918	2,088	2,276	2,484	2,716	2,972	3,257	3,572	3,920	4,303	4,725
1,021 1,156 1,289 1,421 1,555 1,	1,156 1,289 1,421 1,555	1,156 1,289 1,421 1,555	1,289 1,421 1,555	1,555		Ψ,	1,694	1,840	1,995	2,163	2,345	2,545	2,765	3,007	3,274	3,569	3,894	4,251	4,643	5,074
1,307 1,458 1,607 1,757 1,	1,458 1,607 1,757	1,458 1,607 1,757	1,458 1,607 1,757	1,757		Ť.	1,911 2	2,072	2,242	2,423	2,618	2,829	3,060	3,313	3,590	3,894	4,227	4,593	4,993	5,430
1,467 1,637 1,804 1,972 2,	1,637 1,804 1,972	1,637 1,804 1,972	1,637 1,804 1,972	1,972		2,	2,142 2	2,318	2,502	2,697	2,905	3,129	3,371	3,634	3,920	4,233	4,574	946,4	5,352	5,795
1,826 2,012 2,198	1,826 2,012 2,198	1,826 2,012 2,198	1,826 2,012 2,198	2,198		2,	2,386 2	2,578	2,777	2,986	3,207	3,443	3,696	3,969	4,264	4,584	4,932	5,310	5,721	6,167
	2,025 2,232 2,437	2,025 2,232 2,437	2,025 2,232 2,437	2,437		2,		2,852	3,067	3,290	3,525	3,772	4,036	4,319	4,622	4,950	5,303	5,686	6,009	6,547
2,235 2,463 2,688	2,235 2,463 2,688	2,235 2,463 2,688	2,235 2,463 2,688	2,688		2,9	ı	3,139	3,371	3,609	3,857	4,117	4,391	4,683	4,995	5,328	2,687	6,072	6,488	6,935
2,455 2,705 2,951	2,455 2,705 2,951	2,455 2,705 2,951	2,455 2,705 2,951	2,951		3		3,440	3,688	3,942	4,204	9/4,4	4,761	5,062	5,381	5,720	6,082	6,470	6,885	7,331
	2,685 2,959 3,227	2,685 2,959 3,227	2,685 2,959 3,227	3,227		3	3,491	3,755	4,021	4,290	4,566	4,851	5,146	5,456	5,782	6,126	6,491	6,879	7,293	7,735
1	3,514	3,514	3,514	3,514	1	3	3,800 4	4,084	4,367	4,653	4,943	5,240	5,546	5,864	961,9	6,544	6,911	7,299	7,710	8,146
	3,814	3,814	3,814	3,814		4		4,426	4,728	5,030	5,335	5,645	5,961	6,287	6,625	6,976	7,344	7,730	8,136	8,566
	4,126	4,126	4,126	4,126		- <del>4</del>	4,457	4,782	5,103	5,422	5,742	6,064	6,391	6,725	7,068	7,422	7,789	8,172	8,573	8,993
4,085 4,450 4	4,450	4,450	4,450	4,450		4	4,805	5,152	5,492	5,829	6,164	6,499	988,9	7,177	7,525	7,881	8,247	8,625	9,019	9,428
	4,786	4,786	4,786	4,786		2	5,166.	5,535	5,896	6,251	6,601	8,66,9	7,296	7,644	7,996	8,353	8,717	9,090	9,474	9,872
								5,932	6,314	6,687	7,053	7,413	7,770	8,125	8,481	8,838	9,199	9,566	9,940	10,322
								6,343	942,9	7,138	7,520	7,893	8,260	8,622	8,980	9,337	9,694	10,052	10,414	10,781
								6,768	7,193	7,603	8,001	8,388	8,764	9,132	9,493	6,846	10,201	10,550	10,899	11,248
								7,206	7,654	8,084	8,498	8,897	9,284	9,658	10,021	10,375	10,721	11,060	11,393	11,723
								7,658	8,129	8,579	9,010	9,422	9,818	10,198	10,562	10,914	11,252	11,580	11,897	12,205
										680,6	9,536	9,962	10,367	10,752	11,118	11,466	11,797	12,111	12,410	12,695
										9,613	10,078	10,517	10,931	11,321	11,688	12,032	12,353	12,654	12,933	13,193
										10,152	10,634	11,087	11,510	11,905	12,272	12,611	12,922	13,207	13,466	13,699
										10,706	11,206	11,672	12,104	12,504	12,870	13,203	13,504	13,772	14,009	14,213
										11,274	11,792	12,272	12,713	13,117	13,482	13,809	14,097	14,348	14,561	14,735

 $\frac{1}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Stump and top excluded

Stump and top ex	Cluded														o comp	neight,	1 1001
Diameter breast height outside bark								T	otal helg	htFeet							
Inches_	40	50	60	70	80	90	100	110	120	130	140	150	160	1 70	180	190	200
							-										
6	3	4	5	5	6	7	8	9	9	10	11	12	13				
8	5	7	8	10	11	13	14	15	17	18	20	21	22				
10	8	10	13	15	17	20	22	24	26	28	31	33	35				
12	10	14	18	22	25	28	31	35	38	41	Łį Łį	47	50				
15	13	18	23	28	34	38	43	47	51	56	60	64	68				
16	17	22	28	35	42	49	56	61	67	73	78	84	89				
18	21	27	34	42	50	59	69	78	85	92	99	106	113				
20	26	33	41	50	60	70	81	93	105	113	122	131	140	148	157	166	
22	32	40	49	59	70	82	95	108	122	136	148	158	169	180	190	201	
24	38	47	57	69	82	95	110	125	140	157	174	188	201	214	226	239	
26	44	55	66	79	94	109	125	142	160	178	198	218	236	251	265	280	
28		64	77	90	107	124	142	161	181	201	223	245	268	291	308	325	
30		74	88	103	120	140	160	181	203	225	249	274	300	326	353	373	393
32		84	101	117	135	156	178	202	226	251	277	304	333	362	392	423	447
34			113	132	151	174	198	224	250	278	307	336	367	399	432	466	501
36			127	148	170	192	219	247	276	306	337	370	403	438	473	510	548
38				165	189	213	241	271	303	335	369	405	441	478	517	557	598
40				183	209	236	263	296	331	366	403	44 4 3	480	521	562	605	649
42				202	231	260	289	323	360		• 438	479	521	565	610	656	703
44				222	253	285	317	350	390	432	474	518	564	611	659	708	759
46				242	277	312	346	381	422	466	512	559	608	658	709	762	817
48				264	302	339	377	415	455	502	551	602	654	707	762	818	876
50				286	327	368	409	450	491	540	592	646	701	758	816	876	938
52						398	442	487	531	578	634	691	750	811	873	936	1,002
54						429	477	525	573	620	678	738	801	865	931	998	1,067
56						462	513	564	616	667	722	787	853	921	991	1,062	1,135
58						495	550	605	661	716	771	837	907	979	1,052	1,128	1,205
60						530	589	648	707	766	825	889	962	1,038	1,116	1,196	1,277
62									755	818	881	943	1,020	1,100	1,181	1,265	1,351
64									804	871	938	1,005	1,078	1,162	1,249	1,337	1,427
66 68									855	927	998	1,069	1,140	1,227	1,318	1,410	1,504
									908	984	1,059	1,135	1,211	1,293	1,388	1,485	1,584
70									962	1,042	1,122	1,203	1,283	1,363	1,461	1,563	1,666
72 74											1,188	1,272	1,357	1,442	1,535	1,642	1,750
76											1,254	1,344				1,806	1,924
78											1,323	1,418	1,512	1,607	1,701	1,891	2,014
80											1,394	1,571	1,676	1,780	1,792	1,990	2,106
00											1,400	1,2/1	1,070	1,700	1,005	1,550	2,100

 $<sup>\</sup>frac{17}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Table 17.—Board-foot volume of California red fir by International 1/4-inch rule

Top diameter, 6.5 inches Stump height, 1 foot

Stump and top ex	xcluded														Stump h	eight, 1 f	oot
Diameter breast height outside bark									Total hei	ghtFeet							
outside bark inches_	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
10	38	51	66	84	105	129	157	189	227	269	318	372	433				
12	54	72	92	115	142	173	209	250	296	349	409	477	552				
14	73	95	121	150	184	223	267	317	374	438	511	591	681				
16	94	122	154	191	232	279	332	392	460	536	621	716	822				
18	117	153	192	236	285	341	404	474	554	642	741	851	973				
20	144	187	233	286	344	409	482	564	656	758	871	996	1,135	1,288	1,455	1,638	
22	173	224	279	340	408	483	568	661	766	881	1,010	1,152	1,308	1,479	1,667	1,872	
24	205	264	329	399	477	564	660	766	884	. 1,014	1,158	1,317	1,491	1,683	1,892	2,119	
26	240	308	382	463	552	650	758	878	1,010	1,155	1,316	1,492	1,686	1,897	2,128	2,379	
28		355	440	532	632	742	864	997	1,144	1,306	1,483	1,678	1,891	2,123	2,376	2,652	
30		406	502	605	718	841	976	1,124	1,286	1,465	1,660	1,873	2,107	2,361	2,637	2,937	3,262
32		460	567	683	809	946	1,095	1,258	1,437	1,632	1,846	2,079	2,333	2,610	2,910	3,235	3,587
34			637	766	905	1,056	1,220	1,400	1,595	1,809	2,041	2,295	2,571	2,870	3,195	3,546	3,926
36			711	853	1,007	1,173	1,353	1,549	1,762	1,994	2,246	2,521	2,819	3,142	3,492	3,870	4,278
38				946	1,114	1,296	1,492	1,705	1,936	2,188	2,461	2,757	3,078	3,425	3,801	4,207	4,644
40				1,043	1,226	1,424	1,638	1,869	2,119	2,390	2,684	3,003	3,347	3,720	4,122	4,556	5,023
42				1,144	1,344	1,559	1,790	2,040	2,310	2,602	2,918	3,259	3,628	4,026	4,456	4,918	5,415
44				1,251	1,468	1,700	1,950	2,219	2,509	2,822	3,160	3,525	3,919	4,344	4,801	5,293	5,821
46				1,362	1,596	1,847	2,116	2,405	2,716	3,051	3,412	3,802	4,221	4,673	5,159	5,681	6,241
48				1,477	1,730	2,000	2,289	2,598	2,931	3,289	3,674	4,088	4,534	5,013	5,528	6,081	6,674
50				1,598	1,870	2,159	2,468	2,799	3,154	3,535	3,945	4,385	4,858	5,365	5,910	6,494	7,120
52						2,324	2,654	3,007	3,385	3,790	4,225	4,691	5,192	5,729	6,304	6,921	7,580
54						2,495	2,847	3,223	3,624	4,054	4,515	5,008	5,537	6,104	6,710	7,359	8,053
56						2,673	3,047	3,446	3,872	4,327	4,814	5,335	5,893	6,490	7,129	7,811	8,540
58						2,856	3,254	3,677	4,127	4,608	5,123	5,672	6,260	6,888	7,559	8,276	9,041
60						3,045	3,467	3,914	4,391	4,899	5,441	6,019	6,637	7,297	8,001	8,753	9,554
62									4,662	5,198	5,768	6,376	7,025	7,718	8,456	9,243	10,081
64									4,942	5,505	6,105	6,744	7,424	8,150	8,923	9,746	10,622
66									5,230	5,822	6,451	7,121	7,834	8,593	9,401	10,261	11,176
68									5,526	6,147	6,807	7,509	8,255	9,048	9,892	10,790	11,744
70									5,830	6,481	7,172	7,906	8,686	9,515	10,395	11,331	12,325
72											7,547	8,314	9,128	9,993	10,911	11,885	12,920
74											7,931	8,732	9,581	10,482	11,438	12,452	13,528
76											8,324	9,160	10,045	10,983	11,977	13,032	14,149
78											8,727	9,598	10,519	11,495	12,529	13,624	14,784
80											9,139	10,046	11,004	12,019	13,093	14,229	15,432

 $<sup>\</sup>frac{1}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Table 18.—Board-foot volume of California red fir by Scribner rule in 16-foot logs to a utilized top

Stump and top ex	cluded	20010	20. 20.	, , , ,		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			0, 0, 1, 1, 1		, .	01.10801	0 0 0000	rea top		ameter, vi	
Diameter breast height									Total help	ghtFeet							
outside bark inches	40	50	60	70	80	90	100	110	120	130	140	156	160	170	180	190	200
														•			
1.2	24	41	60	81	105	133	164	199	239	284	334	390	452				
14	38	60	84	1112	142	177	215	259	308	363	424	491	566				
16	54	82	113	147	185	227	274	327	385	451	523	603	692				
18	74	108	146	187	233	284	340	402	471	548	633	726	828				
20	96	138	183	232	287	346	412	485	565	654	752	859	976	1,105	1,245	1,398	
22	121	171	224	283	346	416	492	576	668	769	880	1,002	1,135	1,280	1,438	1,610	
24	149	207	270	337	411	491	578	674	779	894	1,019	1,156	1,305	1,468	1,644	1,836	
26	179	247	320	397	481	573	672	780	898	1,027	1,167	1,320	1,487	1,667	1,863	2,075	
28		290	373	462	557	661	772	894	1,026	1,169	1,325	1,495	1,679	1,878	2,094	2,327	
30		337	431	532	639	755	880	1,015	1,162	1,321	1,493	1,680	1,882	2,101	2,338	2,593	2,867
32 .		388	494	606	726	855	994	1,144	1,306	1,481	1,671	1,876	2,097	2,336	2,594	2,871	3,170
34			560	685	819	962	1,115	1,281	1,459	1,651	1,858	2,082	2,323	2,583	2,863	3,163	3,487
36			631	770	917	1,075	1,244	1,425	1,620	1,829	2,055	2,298	2,560	2,841	3,144	3,469	3,817
38				859	1,021	1,194	1,379	1,577	1,789	2,017	2,262	2,525	2,808	3,112	3,438	3,787	4,161
40				953	1,131	1,320	1,521	1,737	1,967	2,214	2,479	2,763	3,067	3,394	3,744	4,119	4,520
42				1,051	1,246	1,452	1,671	1,904	2,153	2,420	2,705	3,010	3,338	3,688	4,063	4,464	4,892
4,4,				1,155	1,366	1,590	1,827	2,079	2,348	2,634	2,941	3,269	3,619	3,994	4,394	4,822	5,278
46				1,264	1,493	1,734	1,990	2,261	2,550	2,858	3,187	3,537	3,912	4,312	4,738	5,193	5,678
48				1,377	1,624	1,885	2,160	2,452	2,762	3,091	3,442	3,817	4,216	4,641	5,095	5,578	6,093
50				1,496	1,762	2,042	2,337	2,650	2,981	3,333	3,708	4,106	4,531	4,983	5,464	5,976	6,521
52					,	2,205	2,521	2,855	3,209	3,584	3,983	4,406	4,857	5,336	5,845	6,387	6,963
54					Į	2,374	2,712	3,069	3,445	3,844	4,268	4,717	5,194	5,701	6,239	6,811	7,418
56						2,550	2,910	3,289	3,690	4,114	4,562	5,038	5,543	6,078	6,646	7,249	7,888
58						2,732	3,115	3,518	3,943	4,392	4,867	5,369	5,902	6,467	7,065	7,700	8,372
60						2,920	3,327	3,754	4,204	4,679	5,181	5,711	6,273	6,867	7,497	8,164	8,870
62									4,474	4,976	5,505	6,064	6,655	7,280	7,941	8,641	9,381
64									4,752	5,281	5,838	6,427	7,048	7,704	8,398	9,132	9,907
66									5,039	5,595	6,182	6,800	7,452	8,140	8,867	9,635	10,446
68									5,333	5,919	6,535	7,184	7,867	8,588	9,349	10,152	11,000
70									5,637	6,252	6,898	7,578	8,294	9,048	9,844	10,683	11,567
72											7,270	7,982	8,731	9,520	10,351	11,226	12,149
74											7,653	8,397	9,180	10,004	10,870	11,783	12,744
76											8,045	8,823	9,640	10,499	11,402	12,353	13,353
78											8,447	9,259	10,111	11,006	11,947	12,936	13,976
80											8,859	9,705	10,593	11,525	12,504	13,532	14,613

 $<sup>\</sup>frac{17}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Stump and top excluded

Diameter reast height								Total he	ightFee	et					
inches 1	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
6	3	3	4	4	4	5	5	. 6	6	7	7	8	8		
8	5	5	6	7	8	9	9	10	11	12	13	14	15		
10	7	9	10	11	12	14	15	16	18	19	21	22	24		
12	11	12	14	16	18	19	21	23	25	28	30	32	34		
14	14	17	19	22	24	26	29	32	35	38	40	43	46		
16	19	22	25	28	31	35	38	41	45	49	53	57	60		
18	24	28	32	36	40	44	48	52	57	62	67	72	76		
20	29	34	39	44	49	54	59	65	71	77	82	88	94	100	10
22	36	42	47	53	59	65	71	78	86	93	100	107	114	121	12
24	42	49	57	64	71	78	85	93	102	110	119	127	136	144	15
26	50	58	66	75	83	91	100	110	119	129	139	149	159	169	11
28		67	77	87	96	106	116	127	139	150	162	173	185	196	20
30		77	88	99	110	122	133	146	159	172	186	199	212	225	2
32		88	100	113	126	138	151	166	181	196	211	226	241	256	2
34			113	128	142	156	170	187	204	221	238	255	272	289	3
36			127	143	159	175	191	210	229	248	267	286	305	324	3
38				159	177	195	213	234	255	276	298	319	340	361	3
40				177	196	216	236	259	283	306	330	353	377	401	4
42				195	217	238	260	286	312	338	364	390	416	442	4
44				214	238	261	285	314	342	371	399	428	456	485	5
46				234	260	286	312	343	374	405	436	467	499	530	5
48				254	283	311	340	373	407	441	475	509	543	577	6
50				276	307	338	368	405	442	479	515	552	589	626	6
52						365	399	438	478	518	557	597	637	677	7
54						394	430	472	515	558	601	644	687	730	7
56						424	462	508	554	600	647	693	739	785	8
58						454	496	545	594	644	694	743	793	842	8
60						486	531	583	636	689	742	795	848	901	9
62						519	567	623	679	736	793	849	906	962	1,0
64						553	604	664	724	784	844	905	965	1,025	1,0
66						588	642	706	770	834	898	962	1,026	1,091	1,1
68									817	885	953	1,021	1,090	1,158	1,2
70									866	938	1,010	1,082	1,155	1,227	1,2
72											1,069	1,145	1,221	1,298	1,3
74											1,129	1,210	1,290	1,371	1,4
76											1,191	1,276	1,361	1,446	1,5
78											1,254	1,344	1,434	1,523	1,6
80											1,319	1,414	1,508	1,602	1,6

 $<sup>\</sup>frac{17}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Table 20.—Board-foot volume of incense-cedar by International 1/4-inch rule

Stump and top excluded

Top diameter, 6.5 Inches Stump height, 1 foot

Stump and top e	xcruded												3 tump	height, l	1001
Dlameter breast height outside bark					· ·			Total h	eightFe	et					
inches	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
10	31	40	49	58	68	79	90	102	116	130	145	162	180		
12	45	57	70	84	98	113	130	147	166	187	209	233	259		
14	61	78	95	114	133	154	177	201	227	255	285	317	352		
16	80	102	125	149	174	201	231	262	296	332	372	414	460		
18	101	129	158	188	220	255	292	332	375	421	470	524	582		
20	125	159	195	232	272	315	360	410	462	519	581	647	718	795	877
22	151	192	235	281	329	381	436	496	560	629	703	783	869	962	1,061
24	180	229	280	334	392	453	519	590	666	748	836	932	1,034	1,144	1,263
26	212	269	329	392	460	532	609	692	782	878	982	1,093	1,214	1,343	1,483
28		312	381	455	533	617	707	803	906	1,018	1,138	1,268	1,408	1,558	1,719
30		358	438	522	612	708	811	922	1,041	1,169	1,307	1,456	1,616	1,788	1,974
32		407	498	594	696	806	923	1,049	1,184	1,330	1,487	1,656	1,838	2,035	2,246
34			562	671	786	910	1,042	1,184	1,337	1,501	1,678	1,870	2,075	2,297	2,535
36			630	752	882	1,020	1,168	1,327	1,498	1,683	1,882	2,096	2,327	2,575	2,842
38				838	982	1,136	1,301	1,479	1,670	1,875	2,097	2,335	2,592	2,869	3,167
40				928	1,088	1,259	1,442	1,638	1,850	2,078	2,323	2,588	2,873	3,179	3,509
42				1,024	1,200	1,388	1,590	1,806	2,040	2,291	2,561	2,853	3,167	3,505	3,869
£ <sub>0</sub> £ <sub>0</sub>				1,123	1,317	1,523	1,745	1,983	2,238	2,514	2,811	3,131	3,476	3,847	4,246
46				1,228	1,439	1,665	1,907	2,167	2,447	2,748	3,072	3,422	3,799	4,204	4,641
48				1,337	1,567	1,813	2,076	2,359	2,664	2,992	3,345	3,726	4,136	4,578	5,053
50				1,451	1,700	1,967	2,253	2,560	2,890	3,246	3,630	4,043	4,488	4,967	5,483
52						2,128	2,437	2,769	3,126	3,511	3,926	4,373	4,855	5,373	5,930
54						2,294	2,628	2,986	3,371	3,787	4,234	4,716	5,235	5,794	6,395
56						2,468	2,826	3,211	3,626	4,072	4,553	5,072	5,630	6,231	6,877
58						2,647	3,032	3,445	3,889	4,368	4,884	5,441	6,039	6,684	7,377
60						2,833	3,244	3,686	4,162	4,675	5,227	5,822	6,463	7,153	7,895
62						3,025	3,464	3,936	4,444	4,992	5,581	6,217	6,901	7,638	8,430
64						3,223	3,691	4,194	4,736	5,319	5,947	6,624	7,354	8,139	8,983
66						3,428	3,926	4,461	5,036	5,657	6,325	7,045	7,820	8,655	9,553
68									5,346	6,005	6,714	7,478	8,302	9,188	10,141
70									5,665	6,363	7,115	7,925	8,797	9,736	10,746
72											7,527	8,384	9,307	10,300	11,369
74											7,951	8,856	9,831	10,881	12,009
76											8,387	9,341	10,370	11,477	12,667
78											8,834	9,840	10,923	12,089	13,343
80											9,293	10,351	11,490	12,717	14,036

 $<sup>\</sup>frac{17}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Table 21.—Board-foot volume of incense-cedar by Scribner rule in 16-foot logs to a utilized top

Top diameter, variable Stump and top excluded Stump height, 1 foot Diameter Total height--Feet breast height outside bark 40 50 60 70 80 90 100 110 120 130 140 150 170 180 33 40 46 66 73 80 86 93 106 12 27 53 60 99 63 74 84 105 116 126 147 158 168 14 42 53 95 137 61 76 91 106 122 137 152 167 182 198 213 228 243 16 18 83 103 124 145 165 186 207 227 248 269 289 310 331 485 108 162 189 216 242 269 404 431 458 20 135 296 323 350 377 22 136 170 204 238 272 306 340 374 408 442 476 510 544 578 612 24 167 251 377 419 460 502 544 586 628 670 712 754 209 293 335 859 455 505 606 707 758 808 909 26 202 253 303 354 404 556 657 28 300 360 420 480 540 600 660 720 780 839 899 959 1,019 1,079 842 983 1,053 30 351 421 491 562 632 702 772 913 1,123 1,193 1,264 812 894 975 1,219 1,381 1,462 32 406 487 569 650 731 1.056 1.137 1.300 1,582 745 1,024 1,396 1,489 1,675 34 558 651 838 931 1,117 1.210 1,303 740 846 951 1,057 1,163 1,268 1,374 1,480 1,585 1,691 1,797 1,903 36 634 38 834 953 ,072 1,191 1,310 1,429 1,548 1,668 1,787 1,906 2,025 2,144 1,600 2,400 1,067 1,200 1,333 1,467 1,733 1,867 2,000 2,133 2,267 40 933 42 1,038 1,187 1,335 1,483 1,632 1,780 1,928 2,077 2,225 2,373 2,522 2,670 44 1,149 1,313 1,477 1,641 1,806 1,970 2,134 2,298 2,462 2,626 2,790 2,955 1,446 1,627 2,711 2,892 3,253 46 1,265 1,807 1,988 2,169 2,350 2,530 3,073 1,981 3,368 3,566 48 1,387 1,585 1,783 2,179 2,378 2,576 2,774 2,972 3,170 1,514 2,163 2,596 2,812 3,028 3,245 3,461 3,677 3,894 50 1,731 1,947 2,379 52 2.118 2.353 2,588 2,824 3,059 3,294 3,529 3,765 4,000 4,235 3,826 4,081 4.336 4,591 2,806 3,316 54 2,296 2,551 3,061 3,571 3,583 2,481 2,756 3,032 3,308 3,859 4,135 4,410 4.686 4,962 56 5,049 58 2.673 2,970 3,267 3,564 3,861 4,158 4,455 4,752 5,346 5,426 5,745 4,468 4.787 5,107 60 2,872 3,192 3,511 3,830 4.149 5,474 5,816 6.158 62 3,421 3,763 4,105 4,448 4,790 5,132 3,079 64 3,659 4,025 4,390 4,756 5,122 5,488 5,854 6,220 6,586 3,293 5,075 5,466 5,856 6,247 6,637 7,027 66 3,514 3,904 4,294 4.685 7.068 7,483 5,405 5,820 6.236 6.652 68 4,989 5,303 5,744 6,186 6,628 7,070 7,512 7,954 70 8,438 72 6,563 7,032 7,501 7,970 7,448 7,944 8,441 8,937 74 6,951 8,926 76 7,351 7,876 8,401 9,451 78 7,761 8,315 8,870 9,424 9,978 8,182 8,767 9,351 9,936 10,520 80

 $<sup>\</sup>frac{1}{2}$  Diameter classes are midpoint; e.g., 12-inch class includes 11.0-12.9. NOTE.--Block indicates extent of data.

Table 22-Root mean squared errors of form factor equations

			Root mean sq	uared error		
Species	Cui	bic	Internationa	1 1/4-Inch	Scrib	ner
	Ratio	Percent	Ratio	Percent	Ratio	Percent
Douglas-fir	0.04	11.7	0.31	14.8	0.32	17.3
Ponderosa and Jeffrey pine	.05	13.4	.40	17.6	.41	20.9
Sugar pine	.05	15.5	. L <sub>4</sub> L <sub>5</sub>	19.3	. 45	21.7
Lodgepole pine	.04	10.9	. 32	13.6	. 33	16.6
White fir	.04	13.2	.37	17.0	. 36	18.9
California red fir	.04	13.5	.38	18.0	. 38	20.3
Incense-cedar	.04	14.6	.31	19.0	.29	21.6

Table 23—Results of a test of study equations and the old local volume tables against 441
trees of known volume from the Stanislaus National Forest

	Mean	Root mean squ	ared error 1/	Aggregate d	ifference
Species and log rule	volume per tree	Study equations	Old local volume tables	Study equations	Old local volume tables
			Pe	rcent	
Douglas-fir (15 trees):					
Cubic International 1/4-inch Scribner	114.6 780.6 677.1	19.2 24.9 31.1	27.7 51.0 48.1	10.1 9.1 10.7	-0.5 -8.3 -1.2
Ponderosa and Jeffrey pine (146 trees):					,
Cubic International 1/4-inch Scribner	158.9 1,120.1 1,009.2	20.2 26.9 29.5	31.7 56.7 49.5	4.6 2.0 3.4	-8.5 -17.0 -13.3
Sugar pine (34 trees):					
Cubic International 1/4-inch Scribner	214.5 1,546.5 1,417.6	13.0 17.6 43.0	20.8 32.1 38.0	-5.2 -10.3 -9.9	-6.7 -13.9 -10.9
Lodgepole pine (60 trees):					
Cubic International 1/4-inch Scribner	79.0 457.2 411.6	15.8 25.4 30.0	50.5 60.0 77.4	3.8 7.9 4.7	35.0 36.2 41.0
White fir (86 trees):					
Cubic International 1/4-inch Scribner	168.3 1,197.6 1,096.7	15.7 21.4 38.1	22.4 31.2 52.4	-6.2 -9.7 -9.8	-10.8 -15.0 -12.5
California red fir (42 trees):					
Cubic International 1/4-inch Scribner	284.9 2,044.0 1,892.6	17.2 24.8 28.1	28.3 33.4 27.4	-2.6 -10.2 -10.7	1 -5.2 -2.5
Incense-cedar (58 trees):					
Cubic International 1/4-inch Scribner	117.3 769.9 679.4	20.5 28.1 51.7	39.2 52.8 65.7	6 -2.5 -5.0	-20.7 -23.1 -17.9
Combined (441 trees):					
Cubic International 1/4-inch Scribner	159.2 1,108.1 1,005.9	17.9 24.9 34.8	32.9 47.5 43.8	3 -3.8 -3.9	-5.4 -11.6 -8.1

 $<sup>\</sup>frac{1}{2}$  Logarithmic transformation was used to equalize variance.

Table 24—Comparative reliability of diameter-height and diameter-height-form class volume equations in estimating Stanislaus National Forest sample tree volumes

(In percent)

Equation	Cubic		International 1/4-inch		Scribner	
	Root mean 1/	Aggregate difference	Root mean 1/	Aggregate difference	Root mean squared error1/	Aggregate difference
Without form class	16.2	-0.6	20.1	-4.5	23.3	-4.4
With actual form class	12.0	5.4	13.0	1.7	16.3	1.7
With average form class	16.2	-1.8	20.5	-5.7	23.7	-5.5

 $<sup>\</sup>frac{1}{2}$  In order to equalize variance, root mean squared errors were calculated for four factors instead of volume.

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